Initial Study/Proposed Mitigated Negative Declaration:

Access Improvements from Railyards to Richards Boulevard and Interstate 5 Project

T15088300

Prepared for:

City of Sacramento
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October 2009

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Community Development Department

Environmental Planning Services
(916) 808-5538

MITIGATED NEGATIVE DECLARATION

The city of Sacramento, a municipal corporation, does hereby prepare, declare, and publish this Mitigated Negative Declaration for the following described project:

Access Improvements from Railyards to Richards Boulevard and Interstate 5 Project (T15088300)
The proposed project consists of short-term operational, safety, and circulation improvements and access to areas planned for development in the City's General Plan and specific plans. The project would be constructed to accommodate a future interchange improvement project and would be coordinated with stakeholders to address the City's and community's desire for a multimodal, urban riverfront environment.

The Lead Agency is the City of Sacramento. The City of Sacramento, Community Development Department, reviewed the proposed project and, on the basis of the whole record before it, determined that the proposed project is consistent with the land use designation for the project site as set forth in the 2030 General Plan. The City prepared the attached Initial Study that identifies potentially new or additional significant environmental effects (project specific effects) that were not analysed in the 2030 General Plan Master EIR. The City will incorporate all feasible mitigation measures or feasible alternatives appropriate to the project as set forth in the Master EIR, and adopt project-specific mitigation measures in order to avoid or mitigated the identified effects to a level of insignificance. (CEQA Guidelines Sections 15177(d), 15178(b)(2)). This Mitigated Negative Declaration reflects the Lead Agency's independent judgment and analysis. An Environmental Impact Report is not required pursuant to the Environmental Quality Act of 1070 (Sections 21000, et seq., Public Resources Code of the State of California).

This Mitigated Negative Declaration was prepared pursuant to the California Environmental Quality Act (Public Resources Code Sections 21000 et seq.), CEQA Guidelines (Title 14, Sections 15000 et seq. of the California Code of Regulations), the Sacramento Local Environmental Regulations(Resolution 91-892) adopted by the City of Sacramento and the Sacramento City Code. A copy of this document and all supportive documentation may be reviewed or obtained at the City of Sacramento, Community Development Department, 300 Richards Boulevard, 3rd Floor, Sacramento, CA, 95811. The public counter is open from 9:00 am to 4:00 pm Monday through Friday, and closed for lunch from noon until 1:00 pm.

Environmental Services Manager, City of Sacramento, California, a municipal corporation

By: ____

Date: ____

Access Improvements from Railyards to Richards Boulevard and Interstate 5 Project T15088300

Initial Study/Mitigated Negative Declaration

This initial study (IS) has been required and prepared by the City of Sacramento (City) Development Services Department, 300 Richards Boulevard, Sacramento, CA 95811, pursuant to Title 14, Section 15070, of the California Code of Regulations (CCR); and the Sacramento Local Environmental Regulations (Resolution 91-892) adopted by the City of Sacramento.

Organization of the Initial Study

This IS contains the following sections:

- Section 1, “Project Background,” provides summary background information about the project name, location, sponsor, and the date this Initial Study was completed.
- Section 2, “Project Description,” includes a detailed description of the proposed project.
- Section 3, “Environmental Checklist and Discussion,” tiers from the City’s master environmental impact report (MEIR) for its 2030 General Plan. It contains the environmental checklist form along with a discussion of the checklist questions. The following are determined for the proposed project:

  Impact for which the General Plan MEIR mitigates to a less-than-significant level.

  - *Potentially significant impacts*: impacts that may have a significant effect on the environment, but for which the level of significance cannot be appropriately determined without further analysis in an environmental impact report (EIR)

- *Potentially significant impacts unless mitigated*: impacts that could be mitigated to less than significant with the implementation of mitigation measures.
- *Less-than-significant impacts*: impacts that would be less than significant and do not require the implementation of mitigation measures.

- Section 4, “Potentially Affected Environmental Factors,” identifies which environmental factors were determined to have either a potentially significant impact or potentially significant impact unless mitigated, as indicated in the environmental checklist.
- Section 5, “Determination,” identifies the determination of whether impacts associated with development of the proposed project are significant, and what, if any, added environmental documentation may be required.
- Section 6, “References Cited,” contains information on the references cited in this IS.

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Acronyms and Abbreviations

ACM	asbestos-containing material
ADL	aerially deposited lead
Alquist-Priolo Act	Alquist-Priolo Earthquake Fault Zoning Act
APE	area of potential effect
ARB	California Air Resources Board
BCI	Blackburn Consulting
bgs	below ground surface
BMPs	best management practices
CAAQS	California ambient air quality standard
Caltrans	California Department of Transportation
CC	Sacramento City Council
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CIP	capital improvement plan
City	City of Sacramento
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CO	carbon monoxide
COZEEP	Construction Zone Enhanced Enforcement Program
CRHR	California Register of Historical Resources
CSS	combined sewer system
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel
dbh	diameter at breast height
Delta	Sacramento–San Joaquin River Delta
DLCRC	District Lane Closure Review Committee
DNA	Downtown Natomas Airport
DPM	diesel particulate matter
DTM	district traffic manager
DTSC	California Department of Toxic Substances Control
DWR	California Department of Water Resources
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FSP	Freeway Safety Patrol
FTA	Federal Transit Administration

g	the acceleration speed of gravity
GIS	geographic information system
I-5	Interstate 5
IS/MND	initial study/mitigated negative declaration
L_{dn}	day-night level
L_{eq}	equivalent sound level
LOS	level of service
MEIR	master environmental impact report
mph	miles per hour
MSAT	mobile source air toxic
msl	mean sea level
NO_x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSR	Noise Study Report for Access Improvements from Railyards to Richards Boulevard and Interstate 5
PCBs	polychlorinated biphenyls
PCMSs	portable changeable message signs
PG&E	Pacific Gas and Electric
PM10	particulate matter 10 microns in diameter or less
PM2.5	particulate matter 2.5 microns in diameter or less
ppd	pounds per day
ppm	parts per million
PPMP	pollution prevention and monitoring program
PPV	peak particle velocity
PRC	Public Resources Code
proposed project	Access Improvements from Railyards to Richards Boulevard and Interstate 5 Project
PS&E	plans, specifications, and estimates
PSR	project study report
RAP	remedial action plan
ROG	reactive organic gases
RPA	Register of Professional Archaeologists
RSP	Sacramento Railyards Specific Plan
RT	Regional Transit
RWQCB	Regional Water Quality Control Board
SACOG	Sacramento Area Council of Governments
SMAQMD	Sacramento Metropolitan Air Quality Management District
SMUD	Sacramento Municipal Utility District
SOPA	Society of Professional Archaeologists
SPD	Special Planning District
SQIP	Stormwater Quality Improvement Plan

SR	State Route
SWPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TACs	toxic air contaminants
TMP	traffic management plan
TPH	total petroleum hydrocarbons
UPRR	Union Pacific Railroad
USA	Underground Service Alert
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tanks
VELB	valley elderberry longhorn beetle
VELB Guidelines	*Conservation Guidelines for the Valley Elderberry Longhorn Beetle, 9 July 1999*
WDRs	waste discharge requirements
Williamson Act	California Land Conservation Act of 1965

Section 1
Project Background

Project name and file number:	Access Improvements from Railyards to Richards Boulevard and Interstate 5 Project [T15088300]
Project location:	North of the City of Sacramento’s Central Business District, at the Interchange of Interstate 5 and Richards Boulevard, and within the Railyards Specific Plan area
Project applicant:	Nader Kamal City of Sacramento Department of Transportation New City Hall 915 I Street Sacramento, CA 95814 (916) 808-7035
Environmental planner:	Jennifer Hageman Development Services Department City of Sacramento 300 Richards Boulevard Sacramento, CA 95811 (916) 808-5538
Date initial study completed:	October 2009

Section 2

Project Description

The City of Sacramento (the City), in cooperation with the California Department of Transportation (Caltrans), is proposing the Access Improvements from Railyards to Richards Boulevard and Interstate 5 Project (the proposed project).

Project Location

The proposed project area is in Sacramento and is located east of the Sacramento River, south of the American River, north of the *Sacramento Railyards Specific Plan* (RSP) area, and west of the Richards Boulevard commercial corridor (Figures 2-1 and 2-2).

Project Background

The Interstate 5 (I-5)/Richards Boulevard interchange was originally constructed in 1969 as part of the interstate freeway network. The proximities of the Sacramento River to the west and American River to the north restrict any development to the west and north of the interchange. As a result, the I-5/Richards Boulevard interchange provides primary access to the Richards Boulevard Redevelopment Area located north of the City's Central Business District. This redevelopment area encompasses the RSP area as well as the Township 9 development site and the proposed River District Specific Plan area.

Full buildout of the previously-approved RSP and Township 9 developments would add numerous residences and businesses, resulting in substantial traffic to the area, and would require a number of transportation and circulation improvements, including improvements to the I-5/Richards Boulevard interchange. The anticipated schedule to complete an interchange upgrade project would exceed the initial development timeframes. Consequently, the City is pursuing an immediate project on the local road system that would provide the most beneficial set of access and circulation improvements given the constraints posed by I-5, the existing interchange, and existing development. Upgrades to the I-5/Richards Boulevard interchange to meet long-term capacity needs would be conducted as a future separate project.

To provide relief for existing congestion on Richards Boulevard and projected travel demand for initial stages of redevelopment, the City is proposing to build improvements to:

- The I-5/Richards Boulevard interchange.
- Jibboom Street from Richards Boulevard to Railyards Boulevard.
- Bercut Drive from Richards Boulevard to Railyards Boulevard.
- A segment of Railyards Boulevard that would connect Bercut Drive to Jibboom Street.

The improvements constitute the proposed project addressed in this document and are described in specific detail below (Figure 2-2).

Project Purpose

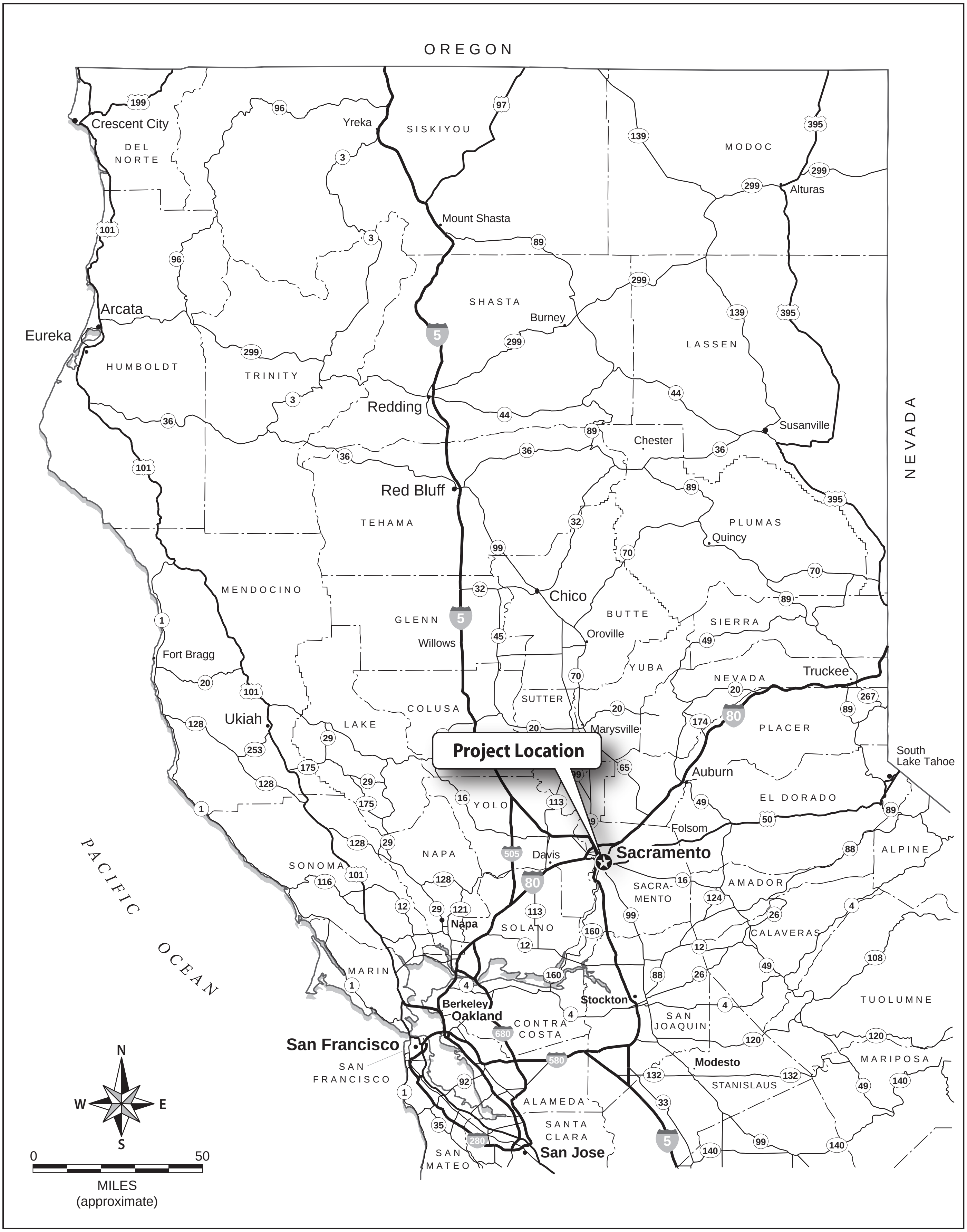
The purpose of the project is to provide short-term operational, safety, and circulation improvements and access to areas planned for development in the City’s General Plan, Township 9, and the RSP. The project would be constructed to accommodate a future interchange improvement project and would be coordinated with stakeholders to address the City’s and community’s desire for a multimodal, urban riverfront environment.

Improve Operations

To meet the primary goal of reduced queuing at the off-ramps and facilitation of traffic on Richards Boulevard through the interchange, Richards Boulevard would be widened within the interchange, the off-ramp termini would be widened, and the signal timing would be reconfigured to optimize operations. Maximizing operations for Jibboom Street and Bercut Drive are secondary considerations.

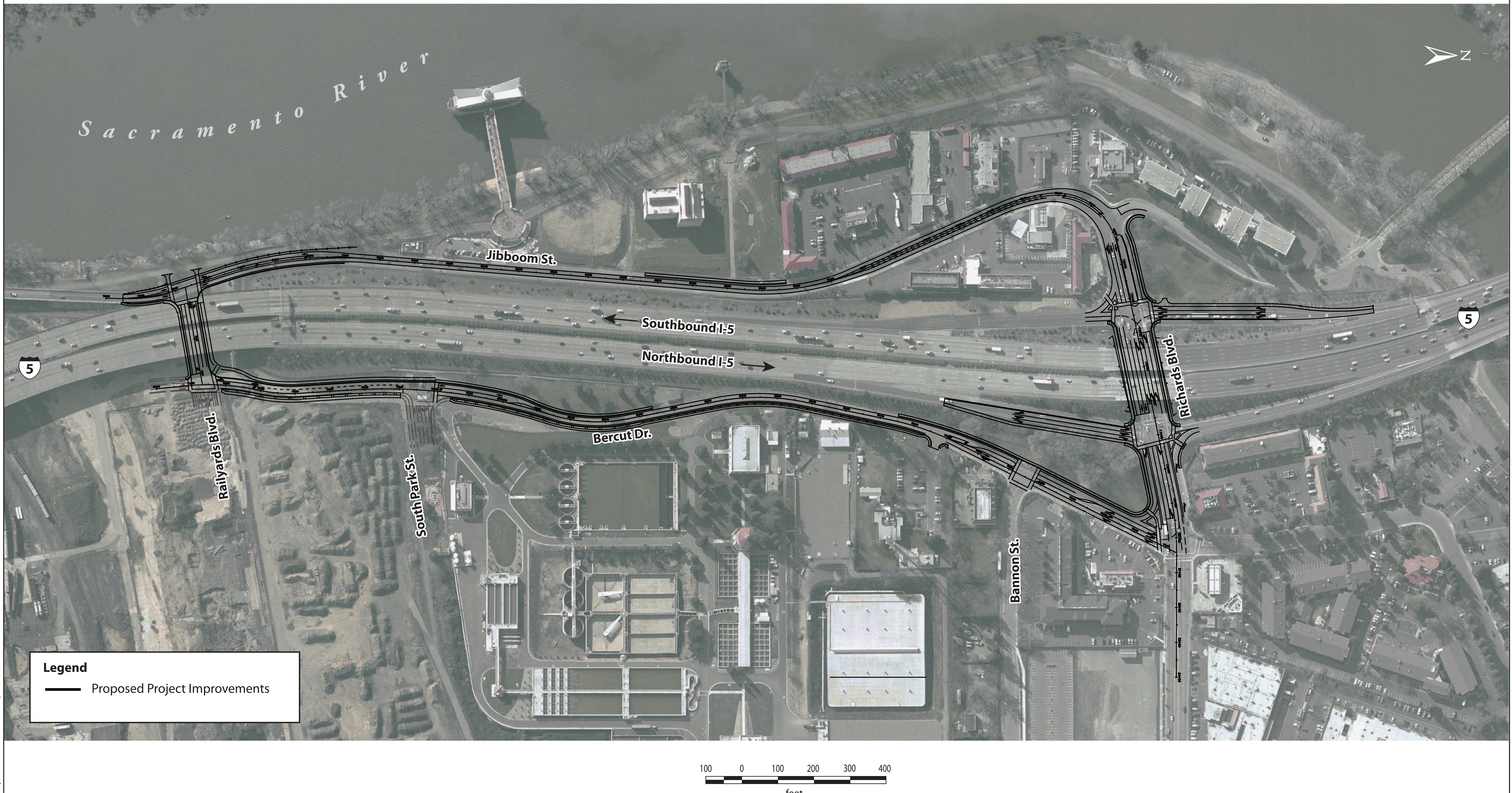
Improve Safety

To meet the goal of improving the safety of the transportation system within the interchange, additional lanes would be added to the off-ramps and Richards Boulevard to reduce queuing onto mainline I-5. The local street improvements would be designed to facilitate truck movements and reduce their conflicts with other modes of traffic (curb return radii and “pork chop” islands, separating right turning lanes from the through lanes of the intersecting roadways, would be designed so that trucks would not have to off-track into oncoming vehicular lanes or onto sidewalks). Non-motorized circulation would be enhanced with the addition of bike lanes and improved pedestrian access.



00359.08 Initial Study (04-09)

Figure 2-1
Project Vicinity Map



Source: David Evans and Associates

Graphics/Projects/00359.08 Initial Study (04-09)

Figure 2-2
Project Location

Improve Access

To meet the goal of providing access to land planned for development, the existing portions of Jibboom Street and Bercut Drive would be reconstructed, Bercut Drive would be extended south, and a new connection between Jibboom Street and Bercut Drive would be constructed beneath I-5.

Project Need

Operation of the I-5/Richards Boulevard interchange off-ramps is currently deficient as indicated by lengthy traffic queues onto mainline I-5 and Richards Boulevard during peak hours. The situation will continue to degrade as redevelopment occurs in the area unless improvements are made to the transportation system.

Jibboom Street and Bercut Drive have gaps in sidewalks and inconsistent shoulder widths without bike-lane designations. Increased vehicular traffic will make nonmotorized movements more difficult, resulting in the need for safer nonmotorized facilities.

Finally, the project is needed to provide more access to areas planned for development by the City. Development of the Railyards and Township 9 are high priorities to the City. However, there is currently limited access to the Railyards from this interchange, and access to the Township 9 site is also limited.

Proposed Project

The I-5/Richards Boulevard interchange provides primary access to the Richards Boulevard Redevelopment Area, which is located north of the City’s Central Business District. This redevelopment area encompasses the RSP area as well as the Township 9 development site (Figures 2-1 and 2-2).

Full buildout of the Railyards and Township 9 developments will add numerous residences and businesses, resulting in substantial traffic to the area and requiring a number of transportation and circulation improvements, including improvements to the I-5/Richards Boulevard interchange. The City is pursuing an immediate project on the local road system that would provide the most beneficial set of access and circulation improvements given the constraints posed by I-5, the existing interchange, and existing development. Upgrades to the ultimate I-5/Richards Boulevard interchange configuration to meet long-term capacity needs would be conducted as a separate project in the future.

I-5/Richards Boulevard Interchange

The I-5 off-ramps would be widened to improve storage and reduce queuing. Caltrans' standard lane and shoulder widths would be used throughout. The I-5 on-ramps would be modified only at their intersections with Richards Boulevard to accommodate the Richards Boulevard widening. Ramp meters would be added to the northbound on-ramp. Richards Boulevard would be widened between Jibboom Street and Bercut Drive to provide added vehicle-lane capacity, and tie-back walls would be used at the bridge abutments. Standard lane widths would be maintained. Six-foot to 8-foot bike lanes would be added to Richards Boulevard, except for the section between the northbound ramps and Bercut Drive where there will be no roadside shoulders. A 4-foot bike lane would be added between the outside through and right-turn lane. Wider sidewalks would be added within the widened sections of Richards Boulevard. The existing signal-controlled intersections would be modified at both ramp intersections with Richards Boulevard, as well as the Richards Boulevard/Bercut Drive intersection.

The off ramp drainage patterns would be perpetuated by replacing the existing overside drains and extending the existing culverts. The storm drain system on Richards Boulevard would remain unchanged where no widening occurs. The widened sections would include curb and gutter, with extensions of the existing underground storm drain systems, which would be supplemented by new inlets and drains to accommodate the added flows from the widened pavement. The existing retention basin located adjacent to the northbound off-ramp would be regraded to restore current basin storage capacity that would be lost from widening Richards Boulevard and the off-ramps.

The existing overhead utilities located in the retention basin, adjacent to the I-5 northbound off-ramp, would be relocated within the basin to accommodate the widening of the northbound off-ramp.

All vegetation within the basins, including existing trees, would be removed. Existing landscaping within the I-5/Richards interchange would be enhanced and accentuated and the areas disturbed by construction would be replaced. The existing landscaping outside of state right-of-way would remain untouched. A total of 36 trees, protected by the City's heritage tree ordinance (Chapter 12.64 of the Sacramento City Code), are present within the project site.

Jibboom Street

No new right-of-way would be acquired along Jibboom Street. Eleven-foot to 12-foot vehicle and 5-foot to 6-foot bike lanes would be constructed. The northern segment of Jibboom Street is constrained by existing businesses. Existing sidewalks, landscaping, and frontages would remain. A 12-foot-wide two-way left-turn lane would be added to improve vehicle access to businesses.

Additionally, a 4-inch sanitary sewer line, 12-inch water line, and 18-inch storm drainage line would be placed under Jibboom Street adjacent to the property owned by Pacific Gas and Electric Company (PG&E). The 4-inch sanitary sewer line and the 12-inch water line would eventually replace the existing lines located on the PG&E property—the site of an historic PG&E power station that is currently planned for redevelopment into a science museum—and would serve the Robert T. Matsui Waterfront Park and the proposed museum. These lines would connect to currently active lines on Jibboom Street, but would remain unused until a future project needed service. The 18-inch storm drainage line would tie into an existing open channel, which in turn would drain into the retention basin located adjacent to the southbound I-5 off ramp.

The southern segment of Jibboom Street is constrained by I-5 along the east side and several environmentally sensitive properties along the west side, namely the Sacramento Levee/River, Robert T. Matsui Waterfront Park, the Sacramento River Parkway (directly adjacent to the southern portion of the street), and the PG&E property. Existing sidewalks and landscaping would be installed adjacent to Robert T. Matsui Waterfront Park. This project may construct the science museum frontage (sidewalk and bike lane), which would fill the existing sidewalk gap on Jibboom Street. If right-of-way is insufficient to install the sidewalk and bike lane along the frontage of the PG&E property, temporary asphalt sidewalks would be constructed and then replaced with permanent sidewalks when the science museum is constructed as part of the science museum project. Further coordination is required to verify whether impacts on wetlands and the historic property can be avoided while constructing the proposed sidewalk and landscaped frontage.

The proposed improvements to Jibboom Street would include restriping, repaving, and widening approximately 600 feet of the southern portion of the existing roadway. Beginning at road stationing “B” 10+50, the existing metal-beam guardrail would be removed to accommodate the planned Jibboom Street road widening. A 2-foot-wide, 3-foot-high concrete barrier would be constructed in its place at the edge of pavement along Jibboom Street, between road stationing “B” 13+50 and 17+50. Between the existing bicycle path and the concrete barrier, a 2-foot-wide portion of dirt would be paved for the length of the concrete barrier using asphalt concrete pavement.

Along the west side of the widened section of Jibboom Street, near Railyards Boulevard and fronting the existing historic PG&E property, curb and gutter with storm drain extensions would be added. The remainder of the storm drainage system along Jibboom Street would stay relatively unchanged as the majority of existing curb and gutter would remain in place.

Pending coordination with the utility companies, if the existing overhead utilities located on Jibboom Street, in the asphalt sidewalk adjacent to I-5 and east of the Robert T. Matsui Waterfront Park and the proposed Science Museum, are relocated underground, Jibboom Street would be shifted toward I-5, and on-street parking would be added to portions of the west side. If these utilities remained on overhead poles, the existing asphalt sidewalk would be maintained with the poles in their existing locations, and on-street parking would not be added to the west side of Jibboom Street. Additionally, to accommodate the widening of the southern portion of Jibboom Street and the construction of the Railyards

Boulevard/Jibboom Street intersection, the existing overhead utilities, located on the east side of the southern portion of Jibboom Street, would need to be relocated. Further coordination with the utility companies is required to determine their new location.

Railyards Boulevard

A short segment of Railyards Boulevard would be constructed. This new roadway would connect Bercut Drive to Jibboom Street with a crossing beneath I-5, using four 11-foot lanes, 6-foot bike lanes, and 16.5-foot sidewalks, which would include tree planters. The Class I trail beginning at the South Park Street/Bercut Drive intersection would be continued on the north side and connect to the Sacramento River Class I trail to the west at the Jibboom Street/Railyards Boulevard intersection.

New signal-controlled intersections with left-turn lanes would be added at the Railyards Boulevard/Jibboom Street and Railyards Boulevard/Bercut Drive intersections.

New curb and gutter with new storm drain laterals to a central line in the street would be added to this portion of Railyards Boulevard. Runoff would be piped to exit the site in its current flow pattern. A new 12-inch water line and 18-inch storm drainage line would be inserted under the portion of Railyards Boulevard running from Jibboom Street to Bercut Drive. Additionally, at the intersection of Railyards Boulevard and Bercut Drive, utility connections for a future 12-inch water line, 72-inch storm drainage line, and 33-inch sanitary sewer line would be constructed. These lines would remain dry until downstream water, storm drainage, and sanitary sewer lines would be built with the future planned RSP development.

Bercut Drive

Bercut Drive between South Park and Bannon Streets is constrained by I-5 on the west side and the water treatment plant along the southeast segment and existing businesses along the northeast segment. No right-of-way acquisitions from private property owners would be required along Bercut Drive. Right-of-way within the Railyards property would transfer via dedication agreements between the Railyards and the City. The northerly segment from Bannon Street to Richards Boulevard would require a relinquishment from the state to the City. This segment is constrained on the east side by existing businesses. All widening would occur within state right-of-way to the west and standard lane and shoulder widths would be accommodated.

Bercut Drive would have 11-foot lanes and 5-foot bike lanes. An 11.5-foot sidewalk with landscaping is proposed on the east side from South Park Street to road stationing 25+00. A 9-foot sidewalk would be installed in the narrow segment from road stationing 25+00 to 35+00. Approximately at road stationing

33+00 this sidewalk would be constructed around an existing joint utility pole. The north driveway entrance to the Sacramento Water Treatment Plant would be smoothed out to create a more even transition onto Bercut Drive.

The southern segment of Bercut Drive between Railyards Boulevard and South Park Street would have 11-foot lanes, no shoulders or bike lanes, a 14.5-foot sidewalk with landscaping on the east side, and a Class I trail on the west side. A new signal-controlled intersection with left-turn lanes would be added at the Bercut Drive/South Park Street intersection. Planter boxes with trees and associated irrigation would be added along the east side of Bercut Drive between Railyards Boulevard and Bannon Street.

Under the southern segment of Bercut Drive, a new 12-inch water distribution (service) main and a new 42-inch water transmission main, which would replace the existing twin 30-inch water transmission mains, would be inserted. The northern portion of these lines would connect to currently active lines on Bercut Drive, but would remain unused until a future project needed service. Additionally, a new 8-inch sanitary sewer line, which would serve the RSP area, would be placed under this portion of Bercut Drive as well. This line would remain dry until downstream sanitary sewer lines would be built with the future planned RSP development.

The storm drainage system along Bercut Drive would include new curb and gutter along the widened and added sections. Runoff along Bercut Drive currently flows from the Railyards property line north and discharges into the existing retention basin adjacent to the northbound I-5 off ramp. This flow pattern is to remain unchanged. A 15-inch storm drainage line would be constructed under Bercut Drive just north of road stationing 21+00. This line would tie into another proposed 18-inch storm drainage line. Runoff from these lines would drain into an existing, open channel that currently discharges into the retention basin located adjacent to the northbound I-5 off ramp. A 12-inch storm drainage line would also be inserted under Bercut Drive, just south of road stationing 28+00. This line would directly outfall into the existing retention basin located adjacent to the northbound I-5 off ramp.

Runoff along Bercut Drive, south of the Railyards property line, flows south to drainage and sewer pipelines. A new 18-inch storm drainage line would be inserted under the portion of Bercut Drive running from South Park Street south to Railyards Boulevard. This line would remain dry until downstream storm drainage lines would be built with the future planned RSP development. After the Railyards property develops, this runoff would eventually flow into the proposed Railyards cistern located just south of the Railyards/Bercut intersection.

Constructability and Staging

There are no known constructability or staging issues related to the proposed project. Anticipated construction staging operations are summarized here.

- Off-ramp widening would require cones and temporary right-shoulder reductions while widening. Contractor access would be from either the ramps or the local streets, or both, through the existing open space in the adjacent interchange quadrants.
- Widening on Richards Boulevard would require cones, or K-rail, and narrowed traffic lanes while widening. Tie-back wall construction at the I-5/Richards undercrossing would require temporary sidewalk closures. Consequently, widening would be allowed only on one side of Richards Boulevard at a time. If temporary on-street shoulders could not be provided on both sides of Richards Boulevard, pedestrian traffic may be required to cross the street between the southbound ramps and Bercut Drive.
- Bercut Drive within the Railyards and Railyards Boulevard would be constructed without staging constraints because these are new roadways in undeveloped terrain.
- Bercut Drive between Richards Boulevard and the Railyards would require cones and narrowed traffic lanes while widening. The sidewalk on the west side would be closed for a period until the widening on that side is complete. However, there is no southerly destination for pedestrian traffic and accordingly no direct impact on pedestrian traffic.
- Widening on Jibboom Street would require cones and narrowed traffic lanes while widening. Work on Jibboom Street may require temporary sidewalk closures on the west side of the street. Pedestrian traffic will likely be accommodated with on-street shoulders during these short-term closures.

Traffic Management Plan

As part of the project, the City would prepare and implement a traffic management plan (TMP) to address short-term disruptions in existing circulation patterns during construction. The TMP would include construction restrictions, requirements, and definitions that would apply to the contractor(s) based on the type of work.

The TMP would develop strategies for public and motorist information, incident management, construction, demand management, and alternate routes. It may require, restrict, or define elements of these strategies.

- No lane closures, shoulder closures, or other traffic restrictions will be allowed on special days, designated legal holidays, and the day preceding designated legal holidays; and when construction operations are not actively in progress (I-5 shoulder closures are anticipated for off-ramp widening).
- The maximum length of any lane closure will be limited to 0.5 mile.
- Only one ramp may be closed at a time within the same interchange. A detour will be set up whenever a ramp is closed.
- Closing ramps for longer than 10 hours will require approval from the Caltrans District 3 Lane Closure Review Committee.

- During ramp closures, traffic will be detoured in accordance with detour traffic handling plans prepared by the project engineer in coordination with traffic operations.
- During final design, stage construction and traffic handling plans will be checked to ensure that all intersections along the detour route meet all Caltrans *Highway Design Manual* (California Department of Transportation 2008) requirements, including truck turning radii and horizontal/vertical clearances.
- Work that does not affect traffic lanes (i.e., work that is more than 6 feet from the edge of traveled way or behind K-rail [California's current standard for a concrete temporary barrier]) may be permitted during all hours without restriction. When K-rail is placed, gawk/glare screen will be recommended to prevent excessive slowing of traffic through the project limits.
- Access to driveways and cross streets must be maintained during construction, in accordance with traffic control standard plans or traffic handling plans.
- Pedestrian access must be maintained during construction, with at least one sidewalk open on one side of the roadway at all times. Additional signs will be required to detour pedestrians when sidewalks are closed for contract work.
- Bicycle traffic must be maintained during construction. Additional signs and striping will be required to direct bicycle traffic when bikeways are closed for contract work.
- Coordination with the City is required to handle traffic through the work area.
- During plans, specifications, and estimates (PS&E), the anticipated construction schedule(s) of adjacent project(s) will be reviewed to determine if nearby projects should be indicated in the special provisions as requiring cooperation of the contractor during construction. The Caltrans area construction manager for the Sacramento area or the district traffic manager (DTM) may be of assistance in determining active nearby Caltrans projects that may be in conflict.
- Special provisions for the contract will include the requirement that the contractor obtain prior approval of the engineer in charge, who in turn should obtain the approval of the Caltrans District 3 DTM prior to performing any lane closures that will interfere with traffic within the state right-of-way. The special provisions will be written to allow adequate time for all notification requirements to be met prior to any lane closure; otherwise, requested lane closure(s) may be denied by the DTM because of conflicts with prior approved requests.
- Portable changeable message signs (PCMSs) are required for the approach to the construction zone. Also, PCMSs will be used to warn the public 7 calendar days prior to implementation of any closure that will require a detour.

- The engineer in charge should have the option to use the Construction Zone Enhanced Enforcement Program (COZEEP) where conditions warrant additional traffic control and enforcement. COZEEP would include two officers per vehicle when performing night work. A freeway safety patrol will be onsite during closures/detour.
- If mainline or ramp closures are anticipated, lane closure charts based on anticipated demands and realistic construction zone capacities should be prepared during the PS&E design phase. Any current or future development that will cause increases in current traffic volumes would be considered when developing lane closure charts for this project.
- This project will have a penalty clause for closures that are not reopened when allowed by the special provisions.
- All TMP requirements, including lane closure charts, will be submitted to the Caltrans TMP unit for review during PS&E.
- If there is a change in the scope or schedule of the project, the TMP unit must be advised because such a change may affect the TMP recommendations.

Phasing

The project would be constructed in two phases and cleared under one environmental document. The purpose for phasing the project is to construct the local street improvements and provide access to the surrounding areas without the longer-term issues associated with the interchange portion of the project, regulatory permitting, retention basin regrading, and state right-of-way relinquishments. The two phases are briefly described below. Environmental process and construction dates for the two phases are provided in Table 2-1.

- **Phase 1—City streets only.** Work on Jibboom Street, Bercut Drive, and Railyards Boulevard. The northerly terminus of work on Bercut Drive would end at or just south of Bannon Street.
- **Phase 2—I-5/Richards Boulevard interchange.** Work in Caltrans right-of-way, which would result in impacts to wetlands and would require associated regulatory permits. The retention basin located in the southeast interchange quadrant would be lowered.

Table 2-1. Phasing Details

Phase	Description	Environmental Process Completed	Start Construction	Finish Construction
1	Bercut, Jibboom, and Railyards	December 2009	July 2010	January 2011[1]
2	Interchange and Richards	December 2009	February 2011	August 2011

[1] Within the RSP area, the construction of Railyards Boulevard, from Bercut Drive to Jibboom Street, and the Bercut Drive extension would be constructed in coordination with other RSP area projects, possibly in 2010.

Section 3
Environmental Checklist and Discussion

Both the *Sacramento 2030 General Plan* and corresponding Master Environmental Impact Report (MEIR) were approved by the Sacramento City Council (CC) on March 3, 2009.

Detailed in this MEIR, on a list of the City's capital improvement plan (CIP) projects anticipated to be constructed sometime within 5 years of the publication of the MEIR, the project proposed in this initial study/mitigated negative declaration (IS/MND) is described as "Access Improvements from the Railyards to Richards Blvd & I-5," located at "Jibboom St. and Bercut Dr. between Richards Blvd. and proposed Gateway Blvd." The CIP project was described as a modification of "Jibboom St. and Bercut Dr. to provide north-south access between Richards Blvd. and proposed Gateway Blvd. Extension project on west side of Railyards." When this CIP was approved, what is now known as Railyards Boulevard in the RSP area was termed Gateway Boulevard. Although with a slightly different design plan, Gateway Boulevard, as proposed in the CIP, followed a similar alignment as Railyards Boulevard, connecting with both Jibboom Street and Bercut Dive within the RSP area. The proposed Access Improvements from Railyards to Richards Boulevard and Interstate 5 project would construct these CIP improvements.

Because it is listed as a subsequent project in the MEIR, the analysis of the cumulative impacts associated with buildout of the City, in accordance with the 2030 General Plan, included the proposed project. Therefore, this IS/MND analyzes the project-specific potential impacts on the environment. Project-specific mitigation measures were developed to reduce all potential impacts to a less-than-significant level.

	Impact for Which the General Plan MEIR Mitigates to a Less-than-Significant Level	Potentially Significant Impact That Requires Analysis in an EIR	Potentially Significant Impact Unless Mitigated	Less-than-Significant Impact
3.1 Land Use. Would the proposed project:				
a. Result in a substantial alteration of the present or planned use of an area?	☐	☐	☐	☒
b. Affect agricultural resources or operation (e.g., impacts on soils or farmlands, or impact from incompatible land uses?)	☐	☐	☐	☒

Environmental Setting

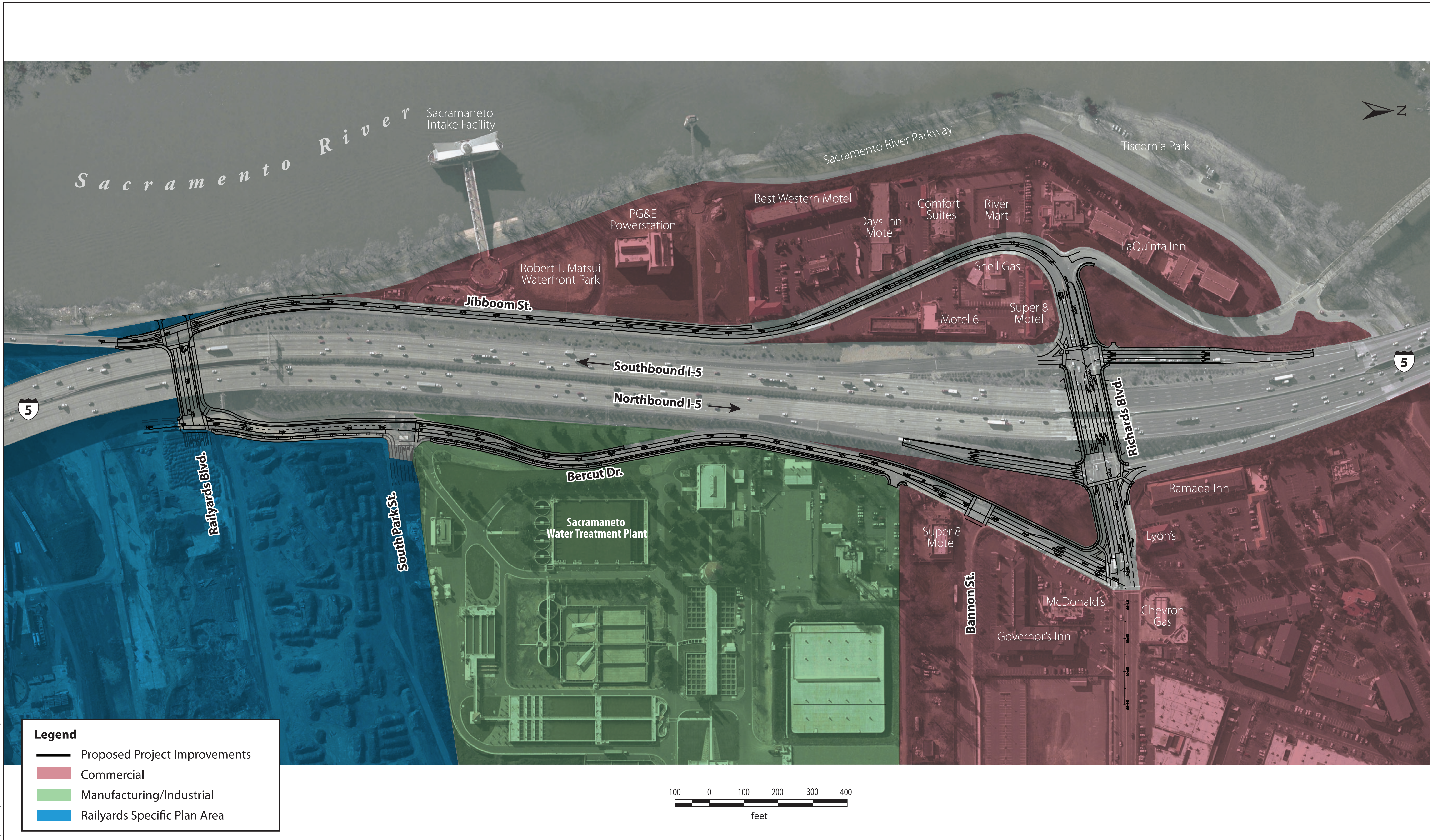
Land uses in the western half of the project vicinity include the Sacramento River Water Intake Facility, the Robert T. Matsui Waterfront Park (formerly Jibboom Street Park), the historic Pacific Gas and Electric (PG&E) power station, multiple hotel and motel uses, and two gas stations (Figure 3.1-1). Multiple hotel and motel uses are located in the eastern half of the project vicinity, as well as one gas station, two restaurants and the Sacramento Water Treatment Plant.

Land uses in the project area are governed by three plans: the City's General Plan, the RSP, and the Richards Boulevard area land use plan.

The *Sacramento 2030 General Plan*, adopted in March 2009, was the first comprehensive revision of the City's General Plan in more than 20 years. The previous plan, adopted in 1988, focused mainly on accommodating growth through horizontal expansion into farmland surrounding the City. The *Sacramento 2030 General Plan* instead seeks to revitalize older communities by bringing new housing, shopping, and employment choices to existing neighborhoods. It emphasizes a balanced transportation system that takes advantage of the City's significant investment in light rail and makes improvements for bicyclists and pedestrians.

Regarding Bercut Drive, the RSP states that "Bercut will have two travel lanes, one in each direction and central turning lanes for most of its length." Regarding the southern portion of the street, the RSP states that "Bercut will also have a wide sidewalk on the east side of the street, with trees located in planters interspersed at regular intervals, and a Class I bicycle and pedestrian path on the west side of the roadway." The RSP also calls for the extension of Railyards Boulevard to Jibboom Street. This guidance is consistent with the proposed project (City of Sacramento 2007b).

The Richards Boulevard Redevelopment Area covers more than 1,365 acres immediately adjacent to the heart of downtown Sacramento, stretching from the



Graphics/Projects/00359.08 Initial Study (04-09)

Figure 3.1-1
Land Use Map

Sacramento River on the west to the American River on the north, Sutter's Landing Regional Park on the east, and the Union Pacific Railroad (UPRR) mainline rail tracks and I Street on the south. Over the past 14 years, the Sacramento Housing and Redevelopment Agency and the City have invested more than $100 million in federal and local public dollars within the area, which is transitioning from an industrial district to a diverse, urban mixed-use district. In response to new growth along the Richards Boulevard corridor, the City established the Richards Boulevard Redevelopment Area in 1990 (City of Sacramento 2008b). A new planning effort by the City is currently underway for this area. Now called the River District, a specific plan is being developed to create a blueprint for the ultimate development of the area.

Regional transportation planning for the area is conducted by the Sacramento Area Council of Governments (SACOG). SACOG also assists in planning for land use, housing, and bicycle networks (Sacramento Area Council of Governments 2008).

No cultivated farmlands are located within the project area or project vicinity. The project area is not designated by the California Department of Conservation's Farmland Mapping and Monitoring Program (FMMP) as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Unique Importance (California Department of Conservation 2006). No California Land Conservation Act of 1965 (Williamson Act) agreements apply to the project (California Department of Conservation 2007).

Standards of Significance

For the purposes of this analysis, a significant impact would occur if:

- The project would substantially alter an approved land use plan, resulting in a physical change to the environment.

The discussions of impacts on the physical environment resulting from the project are in the subsequent sections of this document.

Answers to Checklist Questions

a. The project is consistent with the RSP, the overarching policy document guiding development in the southern portion of the project vicinity.

The RSP states that "Bercut will have two travel lanes, one in each direction and central turning lanes for most of its length." As for the southern portion of the street, the RSP states that "Bercut will also have a wide sidewalk on the east side of the street, with trees located in planters interspersed at regular intervals, and a Class I bicycle and pedestrian path on the west side of the roadway." The RSP also calls for the extension of Railyards Boulevard to Jibboom Street. This guidance is consistent with the proposed project.

The project is also consistent with the Richards Boulevard Redevelopment Area plan, the overarching policy document guiding development in the northern portion of the project vicinity, excerpted below.

> Policy 1.2: Ensure that adequate infrastructure and community facilities are developed to support the proposed mix of uses.
>
> The current condition and configuration of the circulation system in the Richards area is inadequate to accommodate new office and residential development.... In order to successfully create a viable mixed-use district, improvements to the infrastructure, particularly transit and the local street system…must occur along with new development.

Finally, the proposed project site was assumed in the MEIR for the *Sacramento 2030 General Plan*. Detailed in the MEIR on a list of the City's CIP projects anticipated to be constructed sometime within 5 years of the publication of the MEIR, the project is described as "Access Improvements from the Railyards to Richards Blvd & I-5 Jibboom St. and Bercut Dr. between Richards Blvd. and proposed Gateway Blvd. Modify Jibboom St. and Bercut Dr. to provide north-south access between Richards Blvd. and proposed Gateway Blvd. Extension project on west side of Railyards." Therefore, this potential impact is within the scope of the General Plan MEIR and as such would be less than significant.

b. No cultivated farmlands are located within the project area or project vicinity. The project area and project vicinity are not designated by the FMMP as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Unique importance. No Williamson Act agreements apply to the project area or project vicinity.

In addition, the proposed project was assumed in the MEIR for the *Sacramento 2030 General Plan*. This potential impact is within the scope of the General Plan MEIR and as such would be less than significant.

Mitigation Measures

There would be no significant impacts related to land use. No mitigation measures would be required.

Findings

There would be no significant impacts related to land use.

	Impact for Which the General Plan MEIR Mitigates to a Less-than-Significant Level	Potentially Significant Impact That Requires Analysis in an EIR	Potentially Significant Impact Unless Mitigated	Less-than-Significant Impact
3.2 Population and Housing. Would the proposed project:				
a. Induce substantial growth in an area either directly or indirectly (e.g., through projects in an undeveloped area or extension of major infrastructure)?	☐	☐	☐	☒
b. Displace existing housing, especially affordable housing?	☐	☐	☐	☒

Environmental Setting

There are no housing units located in the project area. There are a small number of residences on Bannon Street, just outside the project area. The proposed project is adjacent to the RSP area, which has been designated for mixed-use, transit-oriented neighborhoods, including a significant amount of new high-density housing units.

Standards of Significance

For the purposes of this analysis, a significant impact would occur if:

- The project would induce substantial growth that is inconsistent with the approved land use plan(s) for the area or would displace existing housing, especially affordable housing.

Answers to Checklist Questions

a. The proposed project is a component of the larger City General Plan, RSP, and Richards Boulevard Redevelopment Area plan. The project would not directly induce substantial growth in the project area because no residences or commercial uses are planned as part of the proposed project. The project would not indirectly induce substantial growth in the project area because the project is growth accommodating of previously approved projects.

The project was proposed to ensure that development in the project vicinity proceeds in the planned manner. The City has extensively planned for the growth caused by the project. The RSP and the Richards Boulevard Redevelopment Area plan both call for high levels of growth near the project vicinity and specifically directs the construction of the infrastructure improvements being made by the project as a way to account for this growth.

Given the coordinated growth mechanisms in place, the project is unlikely to substantially encourage unplanned development in the project vicinity or to shift or hasten planned growth in and around the project vicinity. Finally, the proposed project site was assumed in the MEIR for the City's General Plan. Detailed in the MEIR on a list of the City's CIP projects anticipated to be constructed sometime within 5 years of the publication of the MEIR, the project is described as "Access Improvements from the Railyards to Richards Blvd & I-5 Jibboom St. and Bercut Dr. between Richards Blvd. and proposed Gateway Blvd. Modify Jibboom St. and Bercut Dr. to provide north-south access between Richards Blvd. and proposed Gateway Blvd. Extension project on west side of Railyards." Accordingly, this potential impact is within the scope of the General Plan MEIR and as such would be less than significant.

b. There are no residential properties within the project area. No permanent acquisitions or displacements of homes or residents are expected to result from the project.

The impact related to the displacement of existing housing, especially affordable housing, would be less than significant.

Mitigation Measures

There would be no significant impacts related to population and housing. No mitigation measures would be required.

Findings

There would be no significant impacts related to population and housing.

	Impact for Which the General Plan MEIR Mitigates to a Less-than-Significant Level	Potentially Significant Impact That Requires Analysis in an EIR	Potentially Significant Impact Unless Mitigated	Less-than-Significant Impact
3.3 Seismicity, Soils, and Geology. Would the proposal result in or expose people to potential impacts involving:				
a. Seismic hazards?	☒	☐	☐	☐
b. Erosion, changes in topography, or unstable soil conditions?	☐	☐	☒	☐
c. Subsidence of land (groundwater pumping or dewatering)?	☒	☐	☐	☐
d. Unique geologic or physical features?	☐	☐	☐	☒

Environmental Setting

Project Area Geology and Topography

The project area is located on an alluvial floodplain approximately 0.2 mile south-southeast of the confluence of the American and Sacramento Rivers. The underlying deposits are mapped by Wagner et al. (1987) as Quaternary levee and channel deposits. The topography within the project area is generally flat, with a site elevation approximately 20 to 25 feet above mean sea level (msl) based on the U.S. Geological Survey (USGS) 7.5-minute Sacramento East quadrangle. Because of the low topographic position and proximity to the confluence of the Sacramento and American Rivers, the project area has been subjected to repeated inundation by floodwaters during late Holocene time and consequently is underlain by relatively thick alluvial deposits. The surface and subsurface distributions of sandy and clayey deposits are a function of former river alignments on the landscape and of present-day geomorphic processes adjacent to the river channels (i.e., flooding and deposition) (William Lettis & Associates 2007).

Furthermore, a portion of the project area located near and around the intersection of Jibboom Street and Railyards Boulevard encroaches onto the Sacramento Levee, which is part of the Sacramento River Flood Control Project, under the of jurisdiction of the Central Valley Flood Protection Board (CVFPB).

Approval by the CVFPB is required for construction within the levee section, which is defined as the waterside slope and crown of the levee, the landside slope, plus 10 feet landward from the toe. Construction of the Jibboom Street/Railyards Boulevard intersection, and a portion of Railyards Boulevard east of this intersection would encroach within the jurisdiction of the CVFPB.

Thus, the City would be required to obtain an encroachment permit from CVFPB. The process includes CVFPB review and consultation with the U.S. Army Corps of Engineers (USACE) regarding the construction methodology and all penetrations to the levee. Penetrations to the levee at the Jibboom Street/Railyards Boulevard intersection include signal poles, excavation for road grading, installation of below grade wet and dry utilities and storm drain systems, and a 12" water line. All components are considered to determine if they may cause slope instability, underseepages, differential settlement, or anything that may affect levee integrity.

Soils

The project area is composed of soils that are somewhat poorly drained and poorly drained that have a seasonal high water table and are protected by levees. There are three distinct soil map units, as well as what is described as Urban land, identified by the U.S. Department of Agriculture (USDA) Soil Conservation Service, now called the Natural Resources Conservation Service (NRCS): Columbia-Urban land complex, drained, 0% to 2% slopes; Laugenour-Urban land complex, partially drained, 0% to 2% slopes; and Orthents-Urban land complex, 0% to 2% slopes (Tugel 1993). Additional details describing the erosion and runoff characteristics are in the section titled "Accelerated Erosion and Sedimentation."

Table 3.3-1. Soils within the Project Area

Soil Series Name	Depth (inches)	USDA Texture	Color	Shrink-Swell Potential	Hydrologic Group	Runoff
Columbia-Urban land complex, drained, 0% to 2% slopes	0–11	Sandy loam	Light yellowish brown	High	C	Very slow to slow
	11–43	Stratified loamy sand to silt loam	Light yellowish brown			
	43–63	Clay loam	Dark gray			
Laugenour-Urban land complex, partially drained, 0% to 2% slopes	0–16	Loam	Light brownish gray to grayish brown	Low	B	Slow
	16–39	Fine sandy loam	Pale brown			
	39–60	Stratified very fine sandy loam to loam	Pale brown			
Orthents-Urban land complex, 0% to 2% slopes	This soil series is extremely variable because it is derived from nearby soils and sediments of mixed origins. The fill material was used to elevate the land surface and thus reduce the hazard of flooding. Generally speaking, this soil consists of very deep, somewhat poorly drained to well-drained altered soils in filled areas on low flood plains.					
Source: Tugel 1993.						

Furthermore, a *Draft Pavement Design Memorandum: I-5 Richards to Railyards Access Improvement Project* (2009) was prepared by Blackburn Consulting. This report describes the soil types and provides new pavement structural section recommendations for the portions of the proposed project area not within the RSP area. Most of the sample locations contained silty sand and poorly-graded sand. At the north end of Bercut Drive, sandy silt appeared to extend from approximately 1000 feet south of Richards Boulevard to the intersection with Richards Boulevard (Blackburn Consulting 2009a).

Unique Geologic Features

Unique geologic features are not common in the project area or the City of Sacramento. There are no geologic features within the project area that embody the distinctive characteristics of a geologic principle that is exclusive to the region or provides a key piece of geologic information important in geology or geologic history. The project area has been substantially altered by development (e.g., adjacent commercial development and roadway construction, operation, and maintenance). Additionally, there are no active mining claims or valuable mineral deposits located within the project area. The project area is mapped as MZ-3, which is defined as areas containing mineral deposits, the significance of which cannot be evaluated from available data. These areas are not considered to contain significant mineral deposits (City of Sacramento 2009).

Subsidence

Subsidence is the gradual lowering of the earth surface as a result of groundwater withdrawal, compaction and oxidation of peat soils, or hydrocompaction.

The naturally occurring hazard of subsidence of soils within the project area is inferred to be low, based on the absence of organic soils and amount of impervious surfaces within the project area. Groundwater beneath the site is hydraulically connected to the Sacramento River. The river serves as a hydraulic connection, and presumably a barrier, to the potable groundwater on the western side of the Sacramento River. The groundwater beneath the site rises to within 5 feet of the ground surface for up to 6 months of the year. Depth to groundwater during the rest of the year is approximately 15–30 feet below ground surface (Blackburn Consulting 2008). Because of the shallow water table, the structural components necessary for construction of the proposed improvements could require depths that encounter groundwater during construction and could require dewatering. Often, groundwater provides partial support for the near-surface soil materials and, when withdrawn, allows the soils to slough into the excavation. If the dewatering system draws down the water table in the area of the excavation, there is the possibility of undermining structures either on or near the site, causing cracking or collapse.

Seismicity

Seismic hazards include earthquake fault ground rupture and ground shaking (primary hazards), and liquefaction and earthquake-induced slope failure (secondary hazards).

Fault Rupture Hazard

The purpose of the Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) is to regulate development near active faults to mitigate the hazard of surface rupture (Hart and Bryant 1997). Faults in an Alquist-Priolo Earthquake Fault Zone are active faults. As defined under the Alquist-Priolo Act, an active fault is one that has had surface displacement within Holocene time (about the last 11,000 years). An early Quaternary fault (sometimes referred to as a potentially active fault) is one that has had surface displacement during Quaternary time (the last 1.6 million years). A pre-Quaternary fault is one that has had surface displacement before the Quaternary period.

There are no active faults or Alquist-Priolo Earthquake Fault Zones in the vicinity of the project site (Jennings 1994; International Conference of Building Officials 1997; Hart and Bryant 1997; USGS 2009). The closest active fault is the Dunnigan Hills fault, an active fault which is located approximately 33 miles northwest of the project site. Accordingly, the project site is not likely to be affected by surface fault rupture.

Ground-Shaking Hazard

On the basis of a probabilistic seismic hazard map that depicts the peak horizontal ground acceleration values exceeded at a 10% probability in 50 years (Cao et al. 2003; California Geological Survey 2003), the probabilistic peak horizontal ground acceleration values for the project area are 0.1 to 0.2 g (where *g* equals the acceleration speed of gravity). This indicates that the ground-shaking hazard in the project area is low. Farther to the west, the ground-shaking hazard increases, coinciding with the increase in abundance of associated faults and fault complexes (California Geological Survey 2003).

Furthermore, the Uniform Building Code recognizes no active seismic sources in the immediate vicinity of the proposed alignment (International Conference of Building Officials 1997).

Liquefaction

Liquefaction is a phenomenon in which the strength and stiffness of unconsolidated sediments are reduced by earthquake shaking or other rapid loading. Poorly consolidated, water-saturated fine sands and silts having low plasticity and being located within 50 feet of the ground surface are typically considered to be the most susceptible to liquefaction. Soils and sediments that are not water saturated and that consist of coarser or finer materials are generally less susceptible to liquefaction. Geologic age also influences the potential for liquefaction. Sediments deposited within the past few thousand years are generally much more susceptible to liquefaction than older Holocene sediments. Pleistocene sediments are even more resistant, and pre-Pleistocene sediments are generally immune to liquefaction (California Department of Conservation, Division of Mines and Geology 1997).

Based on the types and ages of sediments and the relatively shallow depth to groundwater in the project site, liquefaction susceptibility is high. However, liquefaction potential is low based on the aforementioned low ground-shaking hazard in the project site (California Geological Survey 2003).

Seismically Induced Ground Failure and General Slope Stability

Within the limits of ground disturbance of the project site, there is no risk of naturally occurring large landslides (both seismically and non-seismically induced), because the project area and adjacent land are essentially flat and topographically featureless.

Accelerated Erosion and Sedimentation

The erosion hazard on the level and nearly level terrain that exists in the project area is slight. Erosion potential for all soil map units is addressed in the soil survey (Tugel 1993) as runoff potential. As shown in Table 3.3-1, the runoff potential of the soils is slow to very slow, indicating a low potential for erosion.

Standards of Significance

For the purposes of this analysis, a significant impact would occur if:

- The proposed project would introduce either geologic or seismic hazards by allowing the construction of the proposed project on a site without protection against those hazards.

Answers to Checklist Questions

a. The project area is located approximately 33 miles northwest of the nearest active fault and is not within an Alquist-Priolo Earthquake Fault Zone. Therefore, the chance of fault rupture within the project area would be highly unlikely. The probabilistic peak horizontal ground acceleration values for the proposed project area are 0.1 g to 0.2 g, indicating a low potential for ground shaking. Because of the low probability of ground shaking affecting the project area, the possibility of seismic-induced ground failure is remote.

Sacramento 2030 General Plan Goal EC 1.1 and Policies EC 1.1.1–1.1.3 would ensure that lives and property are protected from seismic hazards. These policies include regular review and enforcement of seismic and geologic safety standards, and geotechnical investigations to determine potential for hazards such as ground rupture, ground-shaking and liquefaction due to seismic events, as well as expansive soils and subsidence problems on sites where these hazards may be present. This potential impact is within the scope of the General Plan and was analyzed in the MEIR. By complying with the City's General Plan policies and the Sacramento City Code, the proposed project would a have a less-than-significant impact on exposing life and property to seismic hazards.

b. Ground disturbance caused by project construction activities could increase erosion and sedimentation rates above preconstruction levels. However, runoff rates (i.e., erosion potential) for the soils in the project area are mapped as very slow to slow and therefore the project would not result in an appreciable loss of topsoil. Project disturbance could affect water quality in the Sacramento River and receiving waters (please refer to Section 3.4 "Water" for additional discussion).

As noted above, the proposed improvements along the southern portion of Jibboom Street and the construction of the western portion of Railyards Boulevard, including underground wet and dry utilities, would encroach onto the Sacramento River Levee. The realigning and repaving of the southern portion of Jibboom Street and the trenching for the utilities under Railyards Boulevard would range from 5 to 15 feet in depth, and would have the potential to compromise the soil stability near the levees. Trench settlement and/or pipe failure could result from improper backfill from excavation. Implementation of Mitigation Measure 3.3-1 would reduce this potential impact to a less-than-significant level by ensuring acceptable backfill materials are used during construction of the proposed project.

Compliance with *Sacramento 2030 General Plan* Policy ER 1.1.6, and the City's Grading, Erosion, and Sediment Control Ordinance (City Code Chapter 15.88) would also lessen the proposed projects potential to result in erosion, changes in topography, or unstable soil conditions. By complying with the City's General Plan policies and the Sacramento City Code, and implementing Mitigation Measure 3.3-1, the proposed project's impact would be less than significant in regard to exposure of life and property to hazards from erosion, topography, or unstable soil conditions.

Furthermore, as the project would construct improvements within the levee slope, which is under the jurisdiction of the CVFPB, the City would be required to submit an encroachment permit application to CVFPB for the proposed project. This application process would include consultation with the U.S. Army Corps of Engineers (USACE) to determine if project features or construction would pose any risk to levee integrity, and whether any additional geotechnical reports would be required. The CVFPB also reviews all plans and technical reports for possible affects to flood control features, and assigns special conditions in the encroachment permit to limit or eliminate risk. It is assumed that the City would comply with all requirements included in the CVFPB permit, and as such, the proposed project would have a less-than-significant impact on the stability of the Sacramento River Levee.

c. As part of the construction permitting process, the City requires completed reports of soil conditions at the specific construction sites to identify potentially unsuitable soil conditions, including liquefaction, settlement, subsidence, lateral spreading, and collapse. The City requires that these evaluations be conducted by registered soil professionals, and measures to correct inappropriate soil conditions must be applied, depending on the soil conditions. Additionally, the design of the project improvements must conform to the analysis and implementation criteria described in the California Building Code. Implementation of General Plan Policies EC 1.1.1 and EC 1.1.2 would also further ensure that the City review and enforce all applicable building codes and require site-specific geotechnical reports for all development projects. This potential impact is within the scope of the General Plan and was analyzed in the MEIR.

By complying with the City's general plan policies and the Sacramento City Code, the project would a have a less-than-significant impact on the effects of subsidence caused by dewatering and construction within the project area.

d. There are no unique geologic features within the project area, and it contains no significant mineral resources. The project area is mapped as a MZ-3. The City is required to respond only to mineral resource recovery areas that have been designated by the state as MRZ-2 (significant existing or likely mineral deposits) (City of Sacramento 2009). Implementation of the proposed project would not result in the loss of unique geologic features or the availability of known mineral resources that would be of value to the state, region, or City. This impact would be less than significant.

Mitigation Measures

Mitigation Measure 3.3-1: Design Plans and Specification Standards for Acceptable Backfill Material.

The design plans and specifications shall specify standards for acceptable backfill materials and require testing (such as gradation) of native soil if it is proposed to be used as structural or pipeline backfill. Backfill would be mechanically compacted or jetted to meet the performance criteria specified by the CVFPB and the USACE.

Findings

All seismic and soil-related impacts associated with the proposed project would be less than significant or would be mitigated by MEIR policies or mitigation measures identified in this section.

	Impact for Which the General Plan MEIR Mitigates to a Less-than-Significant Level	Potentially Significant Impact That Requires Analysis in an EIR	Potentially Significant Impact Unless Mitigated	Less-than-Significant Impact
3.4 Water. Would the proposed project result in or expose people to potential impacts involving:				
a. Changes in absorption rates, drainage patterns, or the rate and amount of surface/stormwater runoff (e.g., during or after construction or from material storage areas, vehicle fueling/maintenance areas, waste handling, hazardous materials handling and storage, or delivery areas)?	☐	☐	☐	☒
b. Exposure of people or property to water-related hazards such as flooding?	☐	☐	☐	☒
c. Discharge into surface waters or other alteration of surface water quality that substantially affect temperature, dissolved oxygen or turbidity, beneficial uses of receiving waters, or areas that provide water quality benefits, or that cause harm to the biological integrity of the waters?	☐	☐	☐	☒
d. Changes in flow velocity or volume of stormwater runoff that cause environmental harm or significant increases in erosion of the project site or surrounding areas?	☐	☐	☐	☒
e. Changes in currents or the course or direction of water movements?	☐	☐	☐	☒
f. Changes in the quantity of ground waters, through direct additions or withdrawal, through interception of an aquifer by cuts or excavations, or through substantial loss of groundwater recharge capability?	☐	☐	☐	☒
g. Altered direction or rate of flow of groundwater?	☐	☐	☐	☒
h. Impacts on groundwater quality?	☐	☐	☐	☒

Environmental Setting

Surface Water Hydrology

There are two major surface waterbodies near the proposed project area, the Sacramento and American Rivers. The Sacramento River borders the western boundary of the project area, and the American River is north of the project area. The two rivers converge at Discovery Park, just north of the project area.

The Sacramento River extends from the headwaters near the California/Oregon border into the Sacramento–San Joaquin River Delta (Delta), which has an official northern boundary at the I Street Bridge (California Water Code 12220). The American River headwaters are near the crest of the Central Sierra Nevada Mountains, near Lake Tahoe in Placer County.

The water levels of the Sacramento and American Rivers vary depending on the time of year, location, diversions, and releases from dams upriver. Both rivers are designated as having multiple beneficial uses, including municipal, agricultural, and recreational uses (Central Valley Regional Water Quality Control Board 2007).

Surface Water Quality

The Sacramento River and the American River have been placed on the Clean Water Act (CWA) Section 303(d) list of impaired waterbodies (State Water Resources Control Board 2006). The American River is listed as being impaired for mercury and unknown toxicity from Nimbus Dam to the confluence with the Sacramento River. The Sacramento River is listed as being impaired for mercury and unknown toxicity (State Water Resources Control Board 2006) from Knights Landing to the I Street Bridge. Mercury in the rivers likely results from historical mining activities in California.

Construction Activities

Construction activities are regulated under the National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges of Storm Water Runoff Associated with Construction Activity (General Construction Permit), provided that the total amount of ground disturbance during construction exceeds one acre or disturbs less than one acre but are part of a larger common plan of development that in total disturbs one or more acres. The Central Valley Regional Water Quality Control Board (RWQCB) enforces the General Construction Permit. Coverage under a General Construction Permit requires the preparation of a Stormwater Pollution Prevention Plan (SWPPP) and notice of intent. The SWPPP includes pollution prevention measures (measures to control erosion, sediment, and non-stormwater discharges and hazardous spills), demonstration of compliance with all applicable local and regional erosion and sediment control standards, identification of responsible parties, a detailed construction timeline, and a best management practices (BMPs) monitoring and maintenance schedule. The notice of intent includes site-specific information and the certification of compliance with the terms of the General Construction Permit.

Groundwater Hydrology

The proposed project overlies the South American Subbasin, which is part of the larger Sacramento Valley Groundwater Basin. The South American Subbasin is bounded by the central Sierra Nevada on the east, the Sacramento River on the west, the American River on the north, and the Cosumnes and Mokelumne Rivers on the south (California Department of Water Resources 2004). The groundwater level within the project area rises up to 5 feet below ground surface (bgs) for 6 months of the year and is hydraulically connected to the Sacramento River (Blackburn Consulting 2008).

Groundwater Quality

The groundwater is typically a sodium magnesium bicarbonate type near the confluence of the Sacramento and American Rivers (California Department of Water Resources 2004). There are areas of groundwater impairments within and adjacent to the project area that resulted from existing and historic activities. Existing and former underground storage tanks (UST) sites, the currently unused historic PG&E power station, and the Jibboom Street junkyard are some of the contributors to the groundwater impairments (Figure 2-2).

Dewatering Activities

While small amounts of construction-related dewatering are covered under the General Construction Permit, the RWQCB has also adopted a NPDES Low Threat Discharge and Dewatering Permit. This permit applies to various categories of dewatering activities and would likely apply to aspects of the proposed project if construction requires dewatering in greater quantities than those allowed by the General Construction Permit. The General Dewatering Permit contains waste discharge limitations and prohibitions similar to those in the General Construction Permit. To obtain coverage, the applicant must submit a notice of intent and a pollution prevention and monitoring program (PPMP). The PPMP must include a description of the discharge location, discharge characteristics, primary pollutants, the receiving water, treatment systems, spill prevention plans, and other measures necessary to comply with discharge limits. A representative sampling and analysis program must be prepared as part of the PPMP and implemented by the permittee, along with recordkeeping and quarterly reporting requirements during dewatering activities. For dewatering activities that are not covered by the General Dewatering Permit, an individual NPDES permit and waste discharge requirements must be obtained from the

RWQCB. The General Dewatering Permit would be applicable to the City and its contractors where excavation activities may encounter the water table.

Flooding

Major storm events can produce high flows in the Sacramento and American River systems. Flood controls along the rivers consist of comprehensive measures including levees, dams, and bypass channels.

The proposed project is located in "Zone X," defined by the Federal Emergency Management Agency (FEMA) as "areas of the 0.2% chance of flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from the 1% annual chance flood." (Federal Emergency Management Agency 2008.) In general, a Zone X classification is for areas located outside the 100-year floodplain.

In addition to the levees that provide flood protection, dams located upstream of the project area provide a level of flood protection by controlling the release of water from the reservoirs. Dams can fail for a variety of reasons, and the effects are often catastrophic. If Folsom Dam were to fail or be overtopped during a rain event, the project area is within the "dam inundation zone" and would likely experience extensive flooding.

Stormwater

Stormwater runoff in Sacramento flows into the City of Sacramento Combined Sewer System (CSS) or into individual drainages with pump stations located throughout the area. Caltrans has two retention basins located in the southeast and northwest interchange quadrants near the project area to which runoff from the right-of-way drains. The CSS is considered to be at or near capacity and would need additional mitigation for any additional flows. The project area drains to both types of systems. One drain inlet within the project area is owned and operated by the City, while the remaining drain inlets, ditches, and swales convey flows to the Caltrans retention facilities. When water levels in the retention basins become high, water is pumped to the American River.

Standards of Significance

For the purposes of this analysis, a significant impact would occur if:

- The project would substantially degrade water quality and violate any water quality objectives set by the State Water Resources Control Board (SWRCB), as a result of increases in sediments or other contaminants generated by construction, increased amounts of impervious surfaces, or operational activities; or

- The project would substantially increase the exposure of people or property to the risk of injury and damage in the event of a 100-year flood.

Answers to Checklist Questions

a, d. Implementation of the proposed project would change absorption rates, drainage patterns, and the amount of stormwater runoff from the project area. The size of the project area is approximately 64 acres. Two stormwater systems collect and convey stormwater runoff during rain events. Approximately 63.2 acres of the project area drains to Caltrans retention basins, and the other 0.8 acre drains to the Sacramento CSS (David Evans and Associates 2009b). Both systems are near or at capacity and would require improvements to accommodate the increased amount of runoff from the proposed project.

According to the preliminary drainage study (David Evans and Associates 2009b), the CSS will not experience increases in stormwater runoff after completion of the proposed project. Pre- and post-construction estimates have the Bannon Street storm drain, the only CSS drain inlet, receiving runoff from 0.77 acre (David Evans and Associates 2009b). The impervious surfaces for the Bannon Street storm drain inlet would not increase as a result of the proposed project. Therefore, no improvements to the City's drainage facilities would be needed. The CSS drainage inlet would be protected during construction, and the post-construction best management practices (BMPs) would remain the same.

During construction of the proposed project, stormwater runoff quality would be protected by using standard Caltrans-approved BMPs to reduce or eliminate potential water quality impairments. Caltrans BMPs are described in the 2003 Caltrans *Stormwater Management Plan* and the City's BMPs are included in the Sacramento *Stormwater Quality Improvement Plan* (SQIP). Both plans list measures that cover sediment and erosion controls, fueling and hazardous materials storage areas, waste handling and cleaning schedules, and known contributors that affect receiving water quality. The proposed project's potential impact to water quality is less than significant.

David Evans and Associates prepared a preliminary drainage plan to evaluate and recommend possible upgrades to convey the additional amount of runoff from the project area that does not drain to the CSS (Figure 3.4-1). The most cost-effective solution was to increase the size of retention basin No. 1. The drainage plan concluded that deepening Caltrans retention basin No. 1 by approximately 9 inches would net a storage capacity gain of approximately 49,000 cubic feet. Implementation of this recommendation would be expected to safely convey the increased amount of runoff from the proposed project (David Evans and Associates 2009b).

With implementation of the City's and Caltrans' ordinances and the structural upgrade to Caltrans retention basin No. 1 this impact would be reduced to a less-than-significant level.

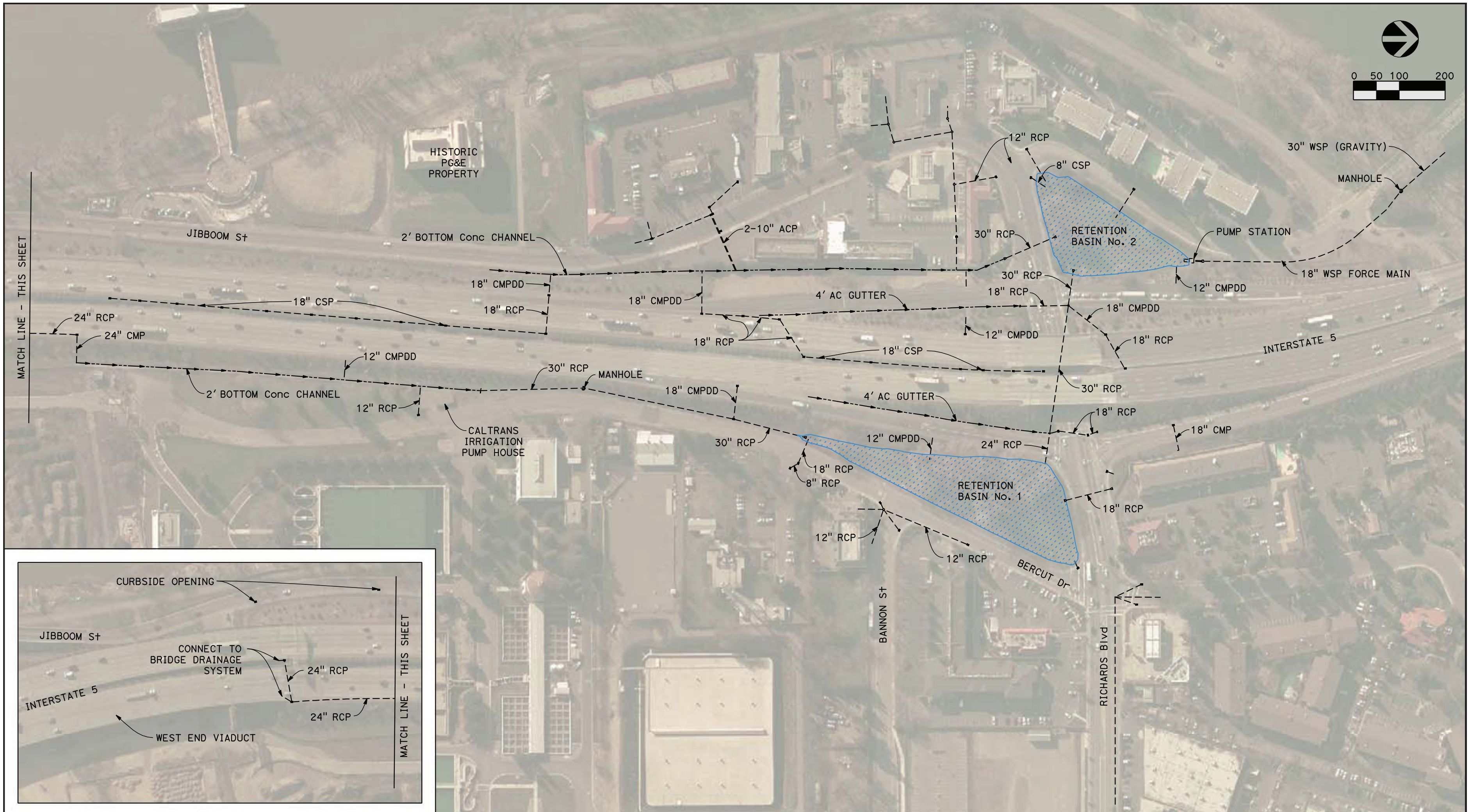
b. The proposed project is located in an area that is protected from flooding with flood control structures such as levees. Construction of utilities would occur on the Sacramento River levee slope. However, with the implementation of Mitigation Measure 3.3-1, discussed in section 3.3 “Seismicity, Soils, and Geology”, the integrity of the levee would not be comprised. Therefore, the proposed project would not expose people or property to water-related hazards, including flooding. However, if the Folsom Dam were to fail, the area could experience extensive flooding. This project would not affect the integrity of Folsom Dam. Thus, this impact would be less than significant.

c. The additional surface water discharges associated with the proposed project would not deplete or significantly affect water quality in the rivers. Caltrans retention basins No. 1 and No. 2 would receive all of the additional stormwater runoff from new impervious surfaces associated with the proposed project. As mentioned above, by regrading retention basin No. 1, the additional amount of stormwater would be safely conveyed to the Caltrans facilities. The City’s CSS would not receive additional flows after the proposed project was completed. Caltrans retention basins act as natural treatment systems for stormwater runoff. Runoff associated with the new impervious surface would be drained to these basins for treatment prior to it being discharged to the American River. The basins provide treatment through percolation, filtration, sedimentation, and other biological processes that reduce or remove pollutants associated with highway and urban stormwater. In addition, water quality associated with dewatering would adhere to the Central Valley RWQCBs waste discharge requirements As such, the proposed project’s impact on the water quality in the rivers would be less than significant.

e. While the proposed project may discharge a small amount of stormwater and dewatering into the Sacramento or American Rivers, the stormwater would be retained and discharged at appropriate times to insure the project does not contribute to flooding potential. Dewatering would only need to occur during construction and the amount would be relatively small and would not affect the hydrology of the Sacramento River or the American River.

Because there is the possibility that dewatering would occur during utility construction, groundwater flow direction would be temporarily altered. Drawdown in the groundwater table would be temporary. There could be minor amounts of groundwater flows that redirected or shifted during that period, but the groundwater levels and direction of flows would return to baseline conditions at completion of the dewatering activities. Therefore, the proposed project would not affect the currents, courses, or direction of water movements, and the impact is considered to be less than significant.

f., g. The proposed project includes increasing the amount of impervious surfaces (2.35 acres), which could reduce the amount of groundwater recharge in the area. However, the majority of groundwater aquifer replenishment in this area results from the deep percolation of water from the major rivers and streams in the basin area. Furthermore, much of the increased runoff associated with this additional impervious surface would likely contribute to groundwater recharge as it percolated from the retention basins.



Source: David Evans & Associates

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Figure 3.4-1
Existing Drainage Facilities

For these reasons, implementation of the proposed project would not affect the quantity of groundwater, flow rates, or loss of groundwater aquifer capacity. This impact is within the scope of the General Plan MEIR and would be less than significant.

h. The additional amount of runoff from increased impervious surfaces (2.35 acres) has the potential to collect roadway contaminants during the storm season ultimately affecting water quality. Because this water may percolate to groundwater from the Caltrans retention basins, there is a potential to affect groundwater quality. However, Caltrans retention basins are designed for the purpose of reducing stormwater pollutants and improving water quality (California Department of Transportation 2003b). Additionally, because the project would comply with the BMPs listed in the 2003 Caltrans *Stormwater Management Plan,* which requires Caltrans to work cooperatively with the appropriate RWQCB and local agency to address and avoid potential groundwater quality concerns, the additional amount of runoff from the proposed project would not therefore significantly affect groundwater quality. This impact would be less than significant.

Mitigation Measures

No mitigation measures are necessary.

Findings

The proposed project would increase the amount of impervious surfaces by approximately 2.35 acres (David Evans and Associates 2009b). Caltrans retention basin No. 1 would be sized adequately to safely convey, capture, and treat the stormwater before it was discharged to the American River or percolated to groundwater. Regrading the retention basin would prevent significant impacts on water quality and flood stage in the American River. Groundwater dewatering for construction activities could be needed, but with implementation of the Central Valley RWQCBs waste discharge requirements, water quality for both surface and groundwater would not be significantly affected by the proposed project.

	Impact for Which the General Plan MEIR Mitigates to a Less-than-Significant Level	Potentially Significant Impact That Requires Analysis in an EIR	Potentially Significant Impact Unless Mitigated	Less-than-Significant Impact
3.5 Air Quality. Would the proposed project:				
a. Violate any air quality standard or contribute to an existing or projected air quality violation?	☐	☐	☐	☒
b. Result in the exposure of sensitive receptors to pollutants?	☐	☐	☐	☒
c. Alter air movement, moisture, or temperature or cause any change in climate?	☐	☐	☐	☒
d. Create objectionable odors?	☐	☐	☐	☒

Environmental Setting

The proposed project is located in Sacramento County, which is within the Sacramento Valley Air Basin. Sacramento County's air quality is classified as nonattainment for the federal ozone and particulate matter (particulate matter 10 microns in diameter or less [PM10] and particulate matter 2.5 microns in diameter or less [PM2.5]) standards and an attainment/maintenance area for the federal carbon monoxide (CO) standards. Sacramento County is also a nonattainment area for the ozone, PM10, and PM2.5 California ambient air quality standards (California Air Resources Board 2008).

Standards of Significance

For the purposes of this analysis, a significant impact would occur under any of the following conditions.

- **Ozone:** The project would increase nitrogen oxide (NO_x) levels above 85 pounds per day (ppd) for short-term effects (construction), or the project would increase ozone precursors (NO_x or reactive organic gases [ROG]), above 65 pounds per day for long-term effects (operation).
- **Particulate matter (PM10 and PM2.5):** The project would emit pollutants at a level equal to or greater than 5% of the California ambient air quality standard (CAAQS) (50 micrograms/cubic meter for 24 hours) if there is an existing or projected violation; however, if a project is below the ROG or NO_x thresholds, it is assumed that the project is below the PM10 threshold as well.

- **Carbon monoxide (CO):** The project would result in CO concentrations that exceed the 1-hour CAAQS of 20.0 parts per million (ppm) or the 8-hour CAAQS of 9.0 ppm.
- **Toxic air contaminants (TACs):** The project would create a health risk of 10 in 1 million for cancer.

Answers to Checklist Questions

a. Checklist question a. is evaluated here for both construction and operational emissions.

Construction Emissions

Table 3.5-1 shows the maximum ppd of NO_x that would be emitted during construction phases. Emissions would not exceed the Sacramento Metropolitan Air Quality Management District's (SMAQMD's) significance threshold of 85 ppd of NO_x. Consequently, the SMAQMD would not require additional NO_x mitigation, and project construction would not violate the NO_x air quality standard or contribute to an existing or projected air quality violation. This impact would be less than significant.

Table 3.5-1. Construction Emissions

Construction Phase	Maximum NO_x Emissions (pounds per day)
Grubbing/land clearing	36.2
Grading/excavation	40.2
Drainage/utilities/subgrade	33.3
Paving	19.5

Note: For each phase (based on the anticipated activity phases that would occur for project construction) listed in the table, emissions were estimated using the Road Construction Model, version 6.3 (Sacramento Metropolitan Air Quality Management District 2008). Construction was assumed to start in 2010 as described in Caltrans' Preliminary Environmental Studies (PES) Form for this project (City of Sacramento 2008c). Project construction was assumed to last for 12 months, with a project length of 1 mile, a disturbed area of 16 acres, and a maximum daily disturbed area of 5 acres.

Operational Emissions

Operation of the project has the potential to generate criteria pollutant emissions of ROG, NO_x, CO, and PM10. Each of these emission impacts is discussed below.

Criteria pollutant emissions: The proposed project would involve improvements to the I-5/Richards Boulevard interchange and adjacent roadways. The project would not increase trip generation, but instead is designed to reduce congestion in the project vicinity that would result from development in the area. The project is included in SACOG's 2007–2009 MTIP and 2006 MTP, both of which have been found by SACOG and the FHWA to meet air quality conformity requirements (Sacramento Area Council of Governments 2006a; Sacramento Area Council of Governments 2006b; Federal Highway Administration 2007). The project would not increase the number of vehicle trips, and it would reduce traffic congestion in the I-5/Richards Boulevard area. Thus, it would result in a net decrease in operational emissions of ROG and NO_x. Because implementation of the project would result in decreased ROG and NO_x emissions, no exceedances of the SMAQMD thresholds of 65 ppd would occur. This impact would be less than significant.

CO hot spots: Project CO concentrations were estimated using the CALINE4 model. Three intersections affected by the project would operate at level of service (LOS)[1] D, E, or F (Fehr & Peers 2008).

- Richards Boulevard/I-5 southbound ramps.
- Richards Boulevard/I-5 northbound ramps.
- Richards Boulevard /Bercut Drive.

These three intersections were included in the CO modeling runs conducted for existing (2008) and future (2021) conditions.

No residential receptors, schools, churches, hospitals, nursing homes, or similar facilities are located in the immediate project vicinity. The closest residence is located across the Sacramento River in West Sacramento. Twelve sensitive receptors in the project area were included in the modeling analysis. All of these receptors represent commercial businesses. Figure 3.5-1 shows the locations of the 12 receptors. Of the 12 receptors included in the CO modeling analysis, the Chevron station (Receptor 8) recorded the highest concentrations.

[1] Level of service is a qualitative measure of traffic operating conditions that ranges from "A" through "F." LOS A refers to uncongested operations. LOS B includes uncongested operations, although slight delays can occur. LOS C refers to light congestion. LOS D refers to significant levels of traffic congestion. LOS E consists of severe congestion with long queues. At LOS F, operating conditions have totally broken down, resulting in stop-and-go driving conditions.

Figure 3.5-1. Sensitive Receptor Locations

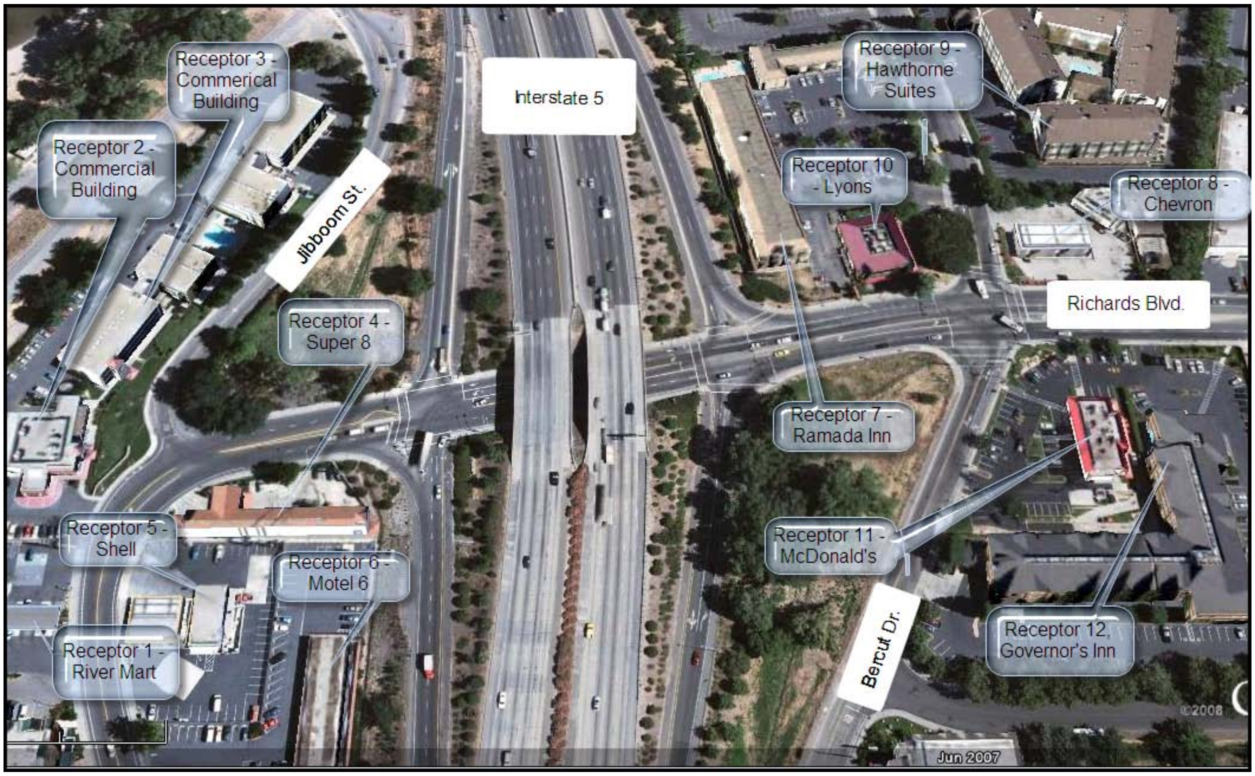


Table 3.5-2 shows the CO modeling results for Receptor 8. One-hour concentrations were estimated using the CALINE4 model, traffic volumes (Fehr & Peers 2008), and on-road CO emission factors developed with the EMFAC2007 model. Both existing and future modeling used worst-case CO emission factors associated with traffic traveling at 1 mile per hour (mph). Eight-hour concentrations represent 1-hour concentrations converted to an 8-hour average using a persistence factor of 0.7 (Garza et. al. 1997). Background concentrations were based on the highest monitored 1-hour and 8-hour concentrations during the last 3 years at the closest CO monitoring site (Table 3.5-2). The results show that, even assuming worst-case modeling conditions, the project would not cause or contribute to violations of the ambient standards. Consequently, the project's CO impacts would be less than significant.

Table 3.5-2. Estimated CO Concentrations (parts per million)

3rd Street/J Street Intersection	Existing	Existing	Future	Future
Averaging period	1-hour	8-hour	1-hour	8-hour
Concentration	1.7	1.2	0.7	0.5
Background	4.7	4.2	4.7	4.2
Total	6.4	5.4	5.4	4.7
Ambient standard	20	9	20	9
Exceed standard?	No	No	No	No

PM10 emissions: The proposed project's net increase of ROG and NO_x would be less than 65 ppd. As described under "Standards of Significance," if a project is below the ROG and NO_x thresholds, it is assumed that the project is below the PM10 threshold, as well. Consequently, the project's PM10 emissions impact would be less than significant.

Neither construction nor operation of the proposed project would result in significant emission impacts. Consequently, the project would not violate any air quality standard or contribute to an existing or projected air quality violation. The project impact on air quality resources would be less than significant.

b. As described for checklist question a., the project would not cause or contribute to violations of the ambient air quality standards. This finding implies that the project would not expose sensitive receptors to elevated levels of criteria pollutants. This impact would be less than significant.

c. The project would not alter air movement, moisture, or temperature. The project is designed to improve short-term circulation in the Richards Boulevard area. By relieving congestion, it will increase the efficiency of vehicle travel, which will reduce overall fuel use and greenhouse gas emissions. Consequently, the project will not increase emissions that would lead to climate change. This impact would be less than significant.

d. The project would not create objectionable odors. Although emissions from diesel powered construction equipment could generate low levels of odors, the odors would be temporary and would be unlikely to result in odor complaints. This impact would be less than significant.

Mitigation Measures

No air quality mitigation measures are required for this project.

Findings

The proposed project would not cause or contribute to violations of ambient air quality standards; expose sensitive receptors to significant levels of pollutants; alter air movement, moisture, or temperature or cause changes in climate; or create objectionable odors.

	Effect Remains Significant With All Identified Mitigation	Effect can be Mitigated to Less-than-Significant	Less-than-Significant Impact
3.6 Transportation/Circulation. Would the proposed project:			
a. Cause an increase in vehicle trips or traffic congestion at intersections, roadways and freeway?	☐	☐	☒
b. Substantially increase hazards to safety from design features (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒
c. Result in inadequate emergency access or access to nearby uses?	☐	☐	☒
d. Result in insufficient parking capacity onsite or offsite?	☐	☐	☒
e. Hazards or barriers for pedestrians or bicyclists?	☐	☐	☒
f. Conflicts with adopted policies supporting alternative transportation (e.g., bus turnouts or bicycle racks)?	☐	☐	☒
g. Result in a change in rail, waterborne, or air traffic pattern that results in substantial safety risks?	☐	☐	☒

Environmental Setting

The existing roadway network, traffic volumes, and operating conditions at key intersections, transit, bicycle, and pedestrian components of the transportation system within the study area are described below. The information provided in this section is based on the *Final Traffic Report for the Interstate 5/Richards Boulevard Interchange Access Improvements Study* prepared by Fehr & Peers on January 7, 2009 (Fehr & Peers 2009).

Existing Roadway Network

The study area includes Richards Boulevard from west of I-5 to east of Bercut Drive and the I-5 mainline from the I Street interchange to the Garden Highway interchange. The following describes the roadway facilities in the study area:

- I-5 is a north/south interstate highway that extends from the Mexican border to the Canadian border. Through the study area, I-5 is an eight-lane freeway with auxiliary lanes in both directions between I Street and Garden Highway.
- Richards Boulevard is a four-lane east/west arterial, which begins at Jibboom Street just west of I-5 and extends approximately 1.5 miles east through the

City's Central Business District, where it intersects with State Route (SR) 160.

- Jibboom Street is a two-lane street, which begins at I Street, extends northerly to Richards Boulevard, and then crosses the American River, terminating within Discovery Park.
- Bercut Drive is a two-lane street, which begins near the northern boundary of the Railyards site, extends northerly to Railyards Boulevard, and terminates at North 3rd Street.

Existing Traffic Volumes and Operation Conditions

A set of intersections, street segments, freeway ramps, and freeway mainline were selected for study based upon the existing traffic pattern and known locations of operational difficulty. This selection was made in collaboration with the City of Sacramento Department of Transportation and Caltrans project team.

The following signalized intersections were analyzed for the weekday a.m. and p.m. peak hours under existing and design-year 2021 conditions:

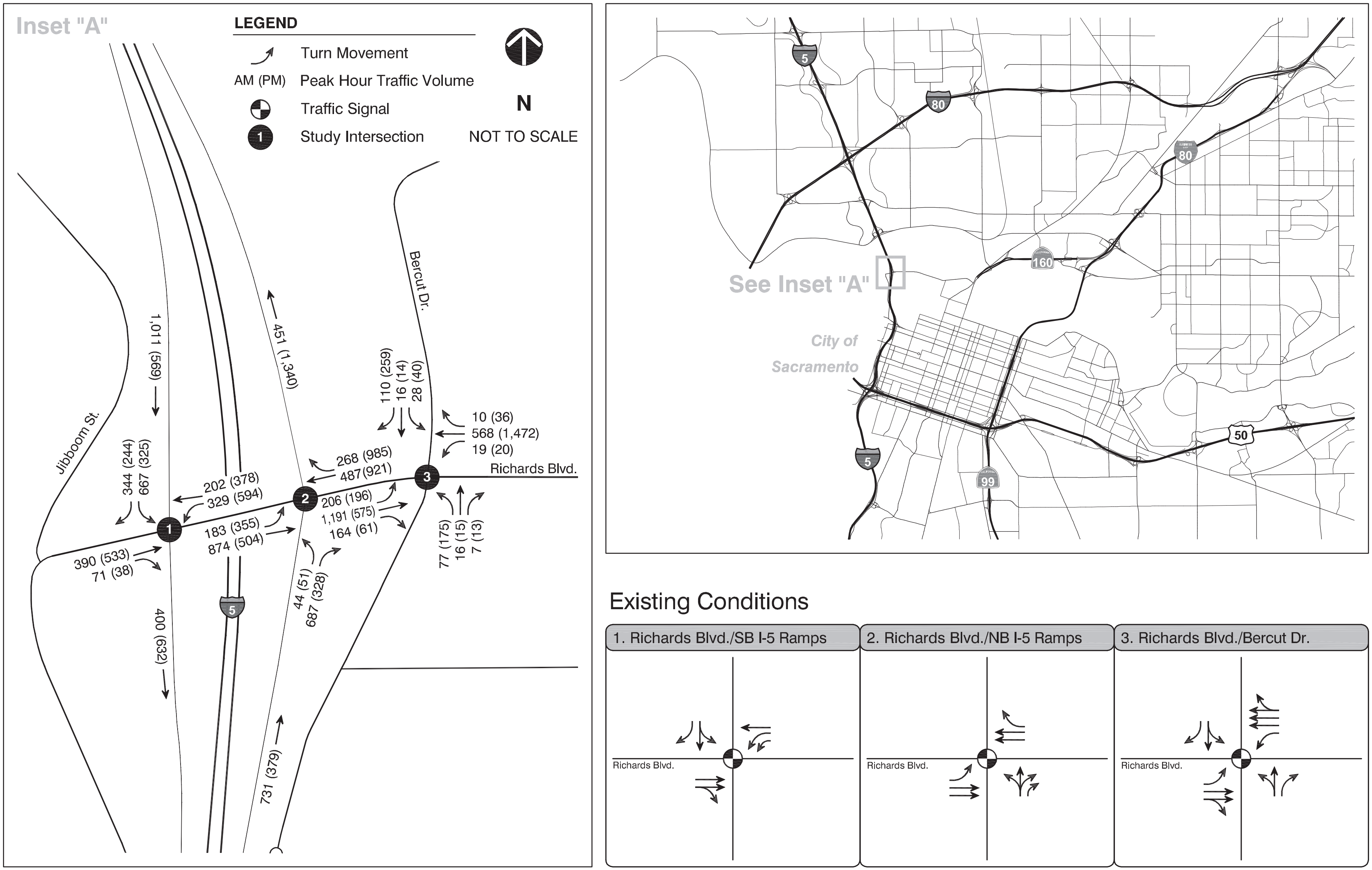
- Richards Boulevard/I-5 southbound ramps.
- Richards Boulevard/I-5 northbound ramps.
- Richards Boulevard/Bercut Drive.

The traffic study also analyzed the mainline segments of I-5 north and south of the Richards Boulevard interchange. Further, the proposed project is an interim improvement project to provide near-term capacity enhancement that would be part of the ultimate reconstruction of the I-5/Richards Boulevard interchange. Additionally, The City of Sacramento is currently preparing the project study report (PSR) for the ultimate interchange design, which will include its own traffic study and the required environmental documentation.

Local Roadway and Intersection Operations

Existing traffic volumes are presented in Figure 3.6-1 (Fehr & Peers 2009). As shown in Figure 3.6-1, I-5 southbound off-ramp volumes to Richards Boulevard are highest in the a.m. peak hour, with I-5 northbound on-ramp volumes from Richards Boulevard highest during the p.m. peak hour. This traffic pattern reflects the current land use characteristics of Sacramento's north Central Business District, which includes largely industrial/commercial uses and very little residential development.

Peak-hour operating conditions at the three analyzed intersections and the results of the evaluation are presented in Table 3.6-1. During the a.m. peak hour, the Richards Boulevard/I-5 southbound ramps intersection features substantial delays. This is due, in part, to the heavy off-ramp left-turn volume (667 a.m.



Source: Fehr and Peers

Figure 3.6-1
Existing Traffic Volumes

peak-hour vehicles) that is served in a single lane. During the p.m. peak hour, substantial delays occur at the Richards Boulevard/Bercut Drive intersection.[2]

Table 3.6-1. Average Vehicle Delay—Existing Conditions

Intersection	A.M. (P.M.) Peak Hour
1. Richards Boulevard/I-5 southbound ramps	216 (72) seconds/vehicle
2. Richards Boulevard/I-5 northbound ramps	16 (17) seconds/vehicle
3. Richards Boulevard/Bercut Drive	11 (248) seconds/vehicle
Source: Fehr & Peers 2009.	

I-5 Mainline Operations

Table 3.6-2 shows the existing a.m. and p.m. peak-hour directional volumes on I-5 across the American River. A VISSIM microsimulation model of I-5 was developed as part of the *I-5/I-80 Interchange Traffic Report* (Fehr & Peers 2008). The model analyzed traffic operations in the peak direction of I-5 between Richards Boulevard and Garden Highway (Fehr & Peers 2009). According to the analysis, the southbound direction of this segment operates at LOS D during the a.m. peak hour. During the p.m. peak hour, the northbound direction of this segment operates at LOS F.

Table 3.6-2. Traffic Volumes on I-5 across the American River—Existing Conditions

Direction	A.M. (P.M.) Peak Hour
Northbound	5,530 (9,380) vehicles
Southbound	8,380 (6,920) vehicles
Source: Fehr & Peers 2009.	

Existing Transit, Bicycle, and Pedestrian Facilities

Sacramento Regional Transit (RT) is the major transit provider within Sacramento County and provides more than 90 routes of light rail and bus service. RT light rail and many bus routes are oriented to transport residents to and from the downtown area. RT light rail service extends from downtown to the Watt/I-80 station to the northeast, to Folsom Station to the east, and to Meadowview Station to the south. RT light rail lines along 7th and 8th Streets connect to the existing Depot, south of the proposed project. Many bus routes also serve the downtown area. RT provides service along three routes in the study area. The 11 and 15 lines serve Richards Boulevard as a regular bus route, while the 33 line serves Bercut Drive and Richards Boulevard during peak hours. (Sacramento Regional Transit District 2009).

[2] Some of the delay and queuing attributed to the Richards Boulevard/Bercut Drive intersection is due to vehicle spillbacks from the Richards Boulevard/I-5 northbound ramps intersection (Fehr & Peers 2009).

The study area has several bicycle and pedestrian facilities. Richards Boulevard features sidewalks on both sides of the street from Jibboom Street east to beyond Bercut Drive. Crosswalks are provided at the three signalized study intersections. In addition, one crosswalk is provided across Richards Boulevard at each signalized intersection to accommodate pedestrians.

A Class II bike lane is striped on both sides of Jibboom Street. A Class II bike lane also exists on both sides of Richards Boulevard east of North 3rd Street. The Sacramento River Parkway bicycle path, a Class I bikeway that runs from Old Sacramento to the American River Parkway, is located west of the proposed project. It is an extension of the Jedediah Smith Memorial Trail that connects Old Sacramento to Folsom. This Class I trail carries most of the bike traffic along this corridor west of I-5.

Methodology

To evaluate existing and future traffic conditions in the project area, the traffic study analyzed intersection and roadway operations and the I-5 mainline freeway operations using the methodologies described below.

Intersection Operations

The study intersections were analyzed using procedures and methodologies that are consistent with the *Highway Capacity Manual* (Transportation Research Board 2000). The Sim Traffic micro-simulation software was used to evaluate vehicle delay, percent demand served, queue lengths, and travel times at the intersections. SimTraffic was selected for use because it considers the effects of signal coordination, closely spaced intersections, lane changing, and vehicle queuing on traffic operations. For assumptions used during modeling and other standard procedures followed, please see the separately bound *Final Traffic Report for the Interstate 5/Richards Boulevard Interchange Access Improvements Study* (Fehr & Peers 2009).

Analysis of the I-5 Mainline

Based on the presence of auxiliary lanes in both directions of I-5 between Garden Highway and I Street, the mainline segments north and south of the I-5/Richards Boulevard interchange were analyzed as weaving sections using the Leisch methodology, as specified in the *Highway Design Manual* (California Department of Transportation 2006).For both intersection and mainline operations analysis, the design year 2021 traffic forecasts were used to analyze both no-project and with-project conditions. The no-project conditions represent cumulative base conditions that are comprised of existing traffic levels increased by a factor to account for ambient growth, plus projected traffic levels from known related projects in the vicinity. In order for a traffic analysis to accurately evaluate the proposed project's impact on traffic operations, future no-project (cumulative base) and plus-project (cumulative plus project) conditions are compared using the appropriate methodologies described above.

Standards of Significance

The standards of significance for transportation utilize policies in the *Sacramento 2030 General Plan*, Mobility Element and, when appropriate, standards used by regulatory agencies. For traffic flow on the freeway system, Caltrans standards have been used.

- **Intersections:** A significant traffic impact occurs for intersections when the traffic generated by a project degrades peak period LOS from A, B, C, or D (no project) to E or F (with project); or the LOS (no project) is E or F, and project-generated traffic increases the peak period average vehicle delay by 5 seconds or more.
- **Freeway Facilities:** Caltrans considers the following to be significant impacts.
  - Off-ramps with vehicle queues that extend into the ramp's deceleration area or onto the freeway.
  - Project traffic increases that cause any ramp's merge/diverge LOS to be worse than the freeway's LOS.
  - Project traffic increases that cause the freeway LOS to deteriorate beyond LOS thresholds defined in the Caltrans Route Concept Report for the facility.
  - The expected ramp queue is greater than the storage capacity.
- **Other Performance Standards:** Because the proposed project is considered to cause interim improvements to an existing facility, other performance standards are being established. A significant traffic impact occurs for intersections, roadway and interchange when a project results in:
  - An increase in vehicle delay.
  - An adverse change in percent of vehicle demand served during a single peak hour.
  - An increase in maximum vehicle queues.
  - An increase in severity and duration of congestion (i.e., peak-hour spreading).
  - An increase in travel time for key movements through an interchange.
- **Transit facilities:** Impacts to the transit system are considered significant if the proposed project would adversely affect public transit operations or fail to adequately provide for access to public transit.
- **Bicycle facilities:** Impacts to bicycle facilities are considered significant if the proposed project would adversely affect bicycle travel or bicycle paths, or fail to adequately provide for access by bicycles.

- **Pedestrian facilities:** Impacts to pedestrian circulation are considered significant if the proposed project would adversely affect pedestrian travel or pedestrian paths, or fail to adequately provide for access by pedestrians.
- **Parking facilities:** Impacts to parking are considered significant if the proposed project would eliminate or adversely affect an existing parking facility, interfere with the implementation of a proposed parking facility, or result in an inadequate supply of parking.

For both intersection and mainline operations analysis, the design year 2021 traffic forecasts were used to analyze both no-project and with-project conditions. The no-project conditions represent cumulative base conditions comprised of existing traffic levels increased by a factor to account for ambient growth, plus projected traffic levels from known related projects in the vicinity. In order for a traffic analysis to accurately evaluate the proposed project's impact on traffic operations, future no-project (cumulative base) and plus-project (cumulative plus project) conditions are compared using the appropriate methodologies described above.

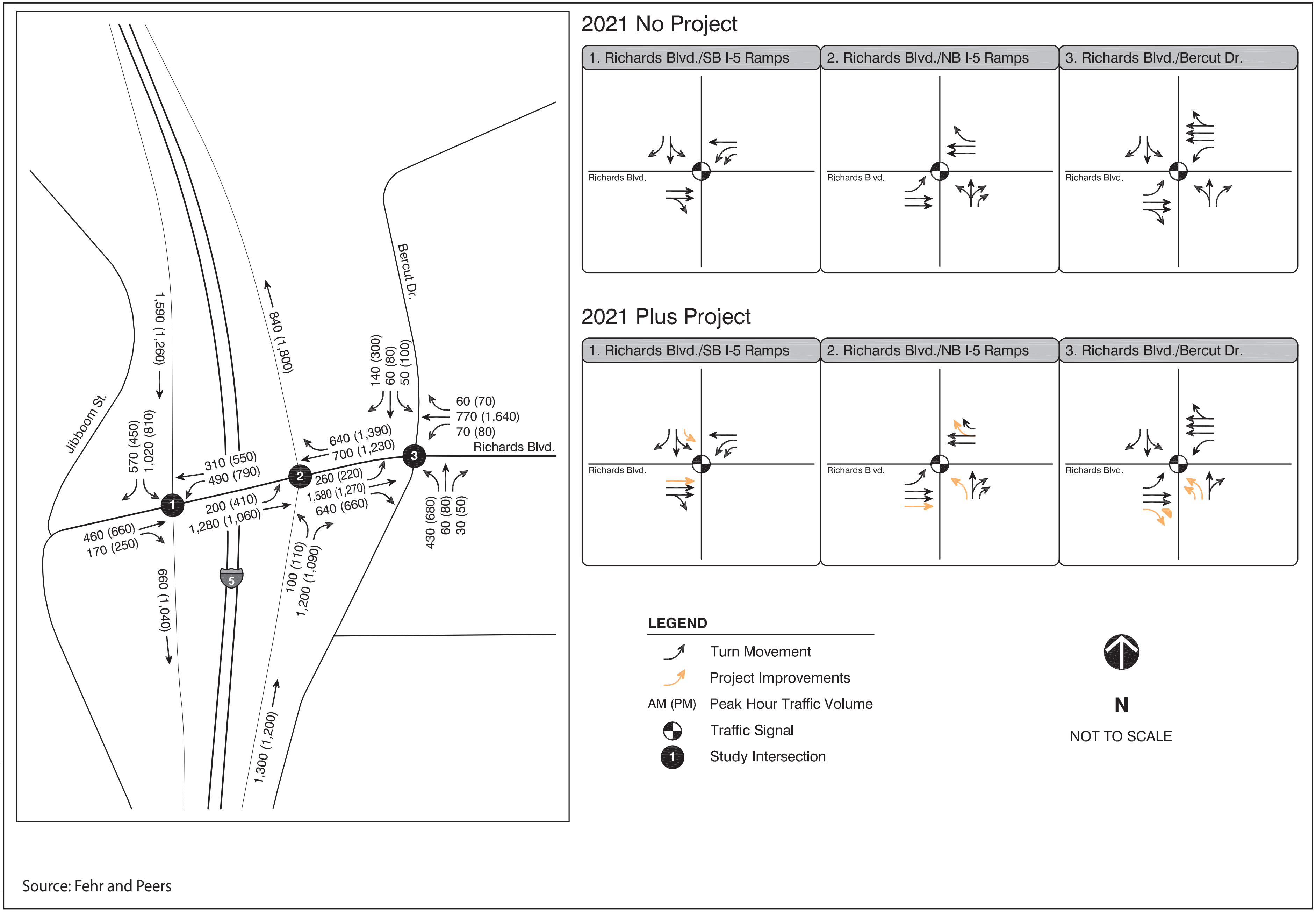
Answers to Checklist Questions

a. The purpose of the project is to provide short-term operational, safety, and circulation improvements and access to areas planned for development in the City's General Plan and specific plans on and in the vicinity of the Richards Boulevard Redevelopment Area. The proposed project does not consist of land uses that would generate or attract new trips in the project area. As such, the proposed project would not negatively affect vehicle/capacity ratios in the project area. Nevertheless, the primary goal of reducing queues at the off-ramps and facilitating traffic on Richards Boulevard through the interchange, Richards Boulevard would be widened within the interchange, the off-ramp termini would be widened, and the signal timing would be reconfigured to optimize operations. Maximizing operations for Jibboom Street and Bercut Drive are secondary considerations.

A traffic analysis was conducted for both no-project and with-project conditions to determine the proposed project's impact on traffic operations during the design-year 2021 (Figure 3.6-2). As discussed above, the traffic analysis evaluated traffic impacts on the basis of whether the proposed project would result in changes to vehicle delay, percent of vehicle demand served, vehicle queues, severity and duration of congestion (i.e., peak-hour spreading), or travel time. The proposed project's impact on each of these conditions is discussed below.

Average Vehicle Delay

Table 3.6-3 shows the average intersection delay under design-year 2021 no-project and plus-project conditions. As shown, the proposed project's impact



Source: Fehr and Peers

Graphics … 00359.08 Initial Study (7-09)

Figure 3.6-2
Design Year (2021) Traffic Volumes

would be beneficial because it would significantly reduce average vehicle delay at each intersection, in many cases reducing delay by half or more.

Table 3.6-3. Average Vehicle Delay—Design-Year 2021 Conditions

	A.M. (P.M.) Peak Hour (seconds/vehicle)	
Intersection	No-Project Conditions	Plus-Project Conditions
1. Richards Boulevard/I-5 southbound ramps	394 (265)	112 (150)
2. Richards Boulevard/I-5 northbound ramps	342 (232)	229 (88)
3. Richards Boulevard/Bercut Drive	142 (457)	67 (186)
Source: Fehr & Peers 2009.		

Percent of Vehicle Demand

System wide, the proposed project's impact would be beneficial because it would increase the percent demand served during the a.m. peak hour from about 65% to 80% percent and increase the percent demand served during the p.m. peak hour from about 62% to 78%.

Vehicle Queues

Table 3.6-4 reports the 95th-percentile queue lengths for key movements at the interchange. In most cases, the proposed project would reduce the queue length when compared with no-project conditions. However, in a couple of instances, the increase in queues would be attributable to the proposed project enabling a higher percentage of vehicle demand to reach the study intersections during the peak hours.

Table 3.6-4. 95th-Percentile Queues—Design-Year 2021 Conditions

		A.M. (P.M.) Peak-Hour Queue Lengths	
Intersection	Movement	No Project	Plus Project
1. Richards Boulevard/ I-5 southbound ramps	Southbound left	5,300 (5,800) feet	2,300 (1,600) feet
	Southbound right	500 (450) feet	190 (200) feet
	Eastbound through	2,400 (5,800) feet	3,700 (6,200) feet
2. Richards Boulevard/ I-5 northbound ramps	Northbound right	5,300 (5,800) feet	5,750 (5,100) feet
	Eastbound left	125 (175) feet	300 (325) feet
3. Richards Boulevard/ Bercut Drive	Northbound left	4,250 (5,300) feet	450 (2,725) feet
Source: Fehr & Peers 2009.			

On the I-5 southbound off-ramps, the proposed project would substantially reduce the extent of vehicle queuing during both peak hours. Although volumes would still queue back from the southbound off-ramp onto I-5 under design-year conditions, the extent of these spillbacks is much less (3,000 feet to 4,000 feet) than that under no-project conditions.[3]

On the northbound I-5 off-ramps, the project would reduce queues on the I-5 northbound off-ramp during the p.m. peak hour; the extent of this spillback would be reduced by 700 feet. During the a.m. peak hour, queuing on the northbound off-ramp would increase slightly; however, the percent of northbound off-ramp traffic served during the a.m. peak hour would increase.

On city streets, as on the off-ramps, queuing increases in some locations and decreases in others. Again, increases in queue lengths are largely attributable to the proposed project enabling a higher percentage of vehicle demand to reach the study intersections during the peak hours.

As such, despite improved operations over no-project conditions, the study area would experience significant queuing during peak periods with the proposed project in place.

Traffic operations were analyzed for the weaving sections of I-5 under design-year conditions. All weaving sections are expected to operate at LOS E or F under design-year (2021) conditions, with or without the proposed project. However, with the proposed project, the I-5/Richards Boulevard interchange is able to serve more traffic during peak periods. This results in fewer hours of gridlock each day.

According to the traffic study, vehicle queues on the SB off ramp are significantly reduced with the proposed project. However, queuing from the off ramp onto the I-5 mainline is still expected during peak hours. Vehicle queues on the NB off ramp are significantly reduced during the PM peak hour while queuing from the off ramp onto the I-5 mainline is still expected during both peak hours.

Severity and Duration of Congestion

The hourly travel demand under design-year 2021 conditions would exceed the interchange's capacity under no-project conditions for more than 4 hours in the morning (i.e., LOS F operations). The proposed project's increase in interchange capacity would limit oversaturated conditions to 2 or 3 hours during the a.m. peak period. Therefore the proposed project's impact would be beneficial because it would lessen the severity and duration of congestion in the project area.

[3] The results in Table 3.6-4 might slightly overstate the extent of vehicle queues on the southbound I-5 off-ramp due to the existing estimates for a.m. peak-hour vehicle queues for this movement that extend onto I-5 almost to the American River Bridge. Field observations have not revealed this extent of queuing. It is likely that the same over-prediction that occurs in the existing-conditions SimTraffic model also occurs in the design-year SimTraffic model.

Travel Time

Travel times were compared on two key travel routes through the I-5/Richards Boulevard interchange. The first route represents the time it would take a motorist at the end of the southbound I-5 off-ramp queue to turn left onto eastbound Richards Boulevard and then turn right onto southbound Bercut Drive. The proposed project would result in an average travel-time savings for this route of almost 12 minutes during the a.m. peak hour and about 6 minutes during the p.m. peak hour. The second route represents the time it would take a motorist at the end of the northbound Bercut Drive queue to turn left onto westbound Richards Boulevard and then turn right onto the northbound I-5 on-ramp. The proposed project would result in an average travel-time savings for this route of more than 15 minutes during each peak hour.

Overall, this study found that the proposed access improvements at the I-5/Richards Boulevard interchange and the Richards Boulevard/Bercut Drive intersection would not result in adverse impacts on traffic and circulation in the project area under design-year 2021 conditions when compared with no-project conditions. In many instances, the proposed project's impact would be beneficial because operation of the intersections and the I-5 mainline would improve. With the implementation of the proposed project, the project objectives would be achieved, and the proposed project would substantially improve traffic operations at the proposed project.

During construction, trucks carrying construction materials and equipment would travel to and from the project area. However, in comparison with the total volume of traffic, these trucks would represent a small percentage of traffic and would not result in substantial permanent impacts on traffic. The trucks would use designated truck routes in the county and as designated by the City. I-5 would remain open to traffic throughout the construction period; therefore, the potential for detours would be limited. Any temporary lane and ramp closures required during construction could result in delays. These impacts would be temporary and short-term. Most construction activities requiring closure of lanes and ramps would occur at night. A traffic management plan (TMP), as outlined in Section 2, "Project Description," would be prepared for the project, which would ensure that construction period traffic impacts were minimized. This impact would be less than significant.

b. The proposed project would be designed in accordance with Caltrans and City design guidelines and standards. All project improvements shall be designed and constructed to the satisfaction of the City of Sacramento, Department of Transportation and Caltrans satisfaction. As such, the proposed project would not result in hazards to safety, and no significant impact would occur.

c. Existing and proposed project infrastructure provides adequate emergency access to the nearby uses. The project is required to be designed to appropriate standards, to the satisfaction of the City of Sacramento, Caltrans, and the Sacramento Fire Department. Therefore, the project would not result in inadequate emergency access or access to nearby use, and no significant impact would occur.

During construction, the project proponent would prepare a TMP that ensures that construction period traffic impacts were minimized. The TMP would identify the type of construction work; lane/road closure; traffic management measures to minimize impacts; and provisions made for emergency vehicles, heavy vehicles, cyclists, and pedestrians. In addition, the TMP would assess public transportation services affected and propose a public notification process. Proper notification and advanced warning to nearby emergency service providers, as directed to be included in the proposed project-level TMP, would ensure adequate egress and ingress for emergency service personnel. Therefore, the project would not result in inadequate access to nearby uses or for emergency vehicles. This impact would be less than significant.

d. No available parking would be affected by the project because all construction staging and impacts are planned to be limited to Caltrans and existing City road rights-of-way, and no designated on-street parking currently exists in the project area. No significant impact on parking capacity in the project area would occur.

e. The proposed project would not result in unsafe conditions for pedestrians or bicyclists. Within the project area, sidewalks exist on both the east and west sides of the majority of Jibboom Street. Existing sidewalks on Richards Boulevard would be replaced and widened with the proposed project. Sidewalks on the east edge of Bercut Drive would be extended to the southern edge of the study area. No significant impact on safety conditions for pedestrians and bicyclists would occur.

The proposed project would add bike lanes on both sides of Richards Boulevard within the project area and would replace existing bike lanes along Jibboom Street and extend them to the southern edge of the study area. Pedestrian and bicycle access to the Sacramento River Parkway bicycle path, which connects Old Sacramento to the Jedediah Smith Memorial Trail (located along the north bank of the American River), could be disrupted temporarily during construction. To accommodate the construction of the concrete barrier and the adjacent asphalt concrete pavement along Jibboom Street (see Section 2 for additional details), the northbound lane of the Sacramento River Parkway bicycle path between Jibboom Street road stationing “B” 13+50 and 17+50 would be closed temporarily to allow equipment and contractor access and staging. The southbound bicycle lane would remain open during construction to ensure that the overall use of the bicycle path would not be affected. No actual improvements would be made to the bicycle path.

This construction zone would be coned off to allow limited access for workers and to ensure the exclusion and safety of the bicycle path users. Advance signage would also be placed in both directions of the pathway and bicyclists would be directed to walk their bicycles through this construction zone. Once the construction of the concrete barrier and the adjacent asphalt concrete pavement is complete, use of northbound bicycle lane would resume. With these precautionary measures, the construction adjacent to the Sacramento River Parkway bicycle path would not result in unsafe conditions for pedestrians or bicyclists. This impact would be less than significant.

f. The project would not conflict with alternative modes of transportation and adopted policies. Transportation and mobility policies in the project area are guided by three plans: the *Sacramento 2030 General Plan*, the RSP, and the Richards Boulevard Redevelopment Area land use plan.

The *Sacramento 2030 General Plan* has several alternative transportation policies and plans that support the development of bicycle lanes, light rail transit, and other infrastructure and design requirements that support alternative transportation initiatives. They include policies M3.1.1–M 3.3.3 and M5.1.1–M5.1.12 of the Mobility Element.

The RSP, which was adopted in 2007, is the overarching policy document that guides development within the Railyards planning area. The RSP is intended to advance the policies of the General Plan to create more mixed-use, transit-oriented neighborhoods within the Central City.

According to the RSP, “Bercut will have two travel lanes, one in each direction and central turning lanes for most of its length.” As for the southern portion of the street, the RSP states that “Bercut will also have a wide sidewalk on the east side of the street, with trees located in planters interspersed at regular intervals, and a Class I bicycle and pedestrian path on the west side of the roadway.” The RSP also calls for the extension of Railyards Boulevard to Jibboom Street. This is consistent with the proposed project.

The proposed project is consistent with the three plans and would have a less-than-significant impact as a result.

g. The proposed project would not result in a change in rail, waterborne or air traffic patterns. The proposed project is not located on or adjacent to existing railroad or waterway facilities. The proposed project would not conflict with the operation of the existing rail infrastructure to the south of the project site or the proposed rail infrastructure MOS-1 and the future Downtown Natomas Airport (DNA) line to the east of the project site. The nearest commercial airport is the Sacramento International Airport, located approximately 7 miles north of the project site. A California Highway Patrol airstrip that is publicly owned and privately used is located approximately 2.3 miles west of the proposed project, and an abandoned airstrip is located approximately 2 miles north of the proposed project. Accordingly, the proposed project would result in no significant impacts on air traffic patterns in the project area.

The proposed project would not be located on or adjacent to existing railroad or waterway facilities. However, the proposed project would be located west of an existing light rail corridor and north an existing heavy rail corridor. In addition, a future light rail corridor is proposed just east of the project site, and a proposed high-speed corridor would be located southeast of the proposed project. The southern portion of the proposed project is partially located within the RSP area. According to the RSP, the railroad maintenance and repair activities and other administrative operational functions of the Railyards were relocated in the early 1990s to Roseville. Railroad tracks, which carry east/west freight and passenger trains, remain onsite, running parallel to H Street and then curving north along

7th Street before heading east. The proposed project would not conflict with the operation of the existing rail infrastructure or the proposed rail infrastructure. As a result, no impacts on rail traffic would occur.

Mitigation Measures

No mitigation measures would be necessary.

Findings

Although the proposed project would result in some greater queues, the proposed project overall would result in traffic improvements to the study area. As such, the proposed project would not have a significant effect on traffic and circulation.

	Impact for Which the General Plan MEIR Mitigates to a Less-than-Significant Level	Potentially Significant Impact That Requires Analysis in an EIR	Potentially Significant Impact Unless Mitigated	Less-than-Significant Impact
3.7 Biological Resources. Would the proposed project result in impacts on:				
a. Endangered, threatened or rare species or their habitats (including plants, fish, insects, animals, and birds)?	☐	☐	☒	☐
b. Locally designated species (e.g., heritage or City street trees)?	☐	☐	☒	☐
c. Wetland habitat (e.g., marsh, riparian, and vernal pool)?	☐	☐	☒	☐

Environmental Setting

The biological study area includes the project area and a 100-foot-wide buffer. This 100-foot-wide buffer was added to include elderberry shrubs (*Sambucus Mexicana*), which provide habitat for valley elderberry longhorn beetle (VELB), adjacent to the construction zone that could be indirectly affected by the proposed project. A portion of the biological study area off Jibboom Street, along the Sacramento River, was restricted to terrestrial areas that could provide habitat for elderberry shrubs and, therefore, does not include the river.

Land uses in the project area consist of existing paved roadways and a portion of the RSP area where soil-cleanup activities are currently underway. Land uses within 100 feet of proposed construction improvements include a city park, a water treatment facility, the RSP area, I-5 rights-of-way, and commercial properties, which include hotels, gas stations, and restaurants. These areas comprise the biological study area (Figure 3.7-1).

The natural communities in the biological study area have been substantially altered by development (e.g., commercial development and roadway construction, operation, and maintenance). The following distinct communities were identified and mapped in the biological study area: Great Valley cottonwood riparian forest, valley oak–Fremont cottonwood woodland, ruderal annual grassland, depressional wetlands, drainage ditches, and landscaped/developed areas (Figure 3.7-1). The developed/landscaped areas are not natural communities.

After review of the California Native Plant Society's (CNPS's) online *Inventory of Rare and Endangered Plants* (California Native Plant Society 2009), the California Natural Diversity Database (CNDDB) (2009), and a species list from the U.S. Fish and Wildlife Service (USFWS) (2009), 22 special-status plant species and 29 special-status animal species were identified as having the potential to occur within the project region (Appendix A).

After completion of a reconnaissance-level survey and review of species distribution and habitat requirement data, it was determined that the biological study area contained potential habitat for only one special-status plant species, Northern California black walnut (*Juglans hindsii*), in the Great Valley cottonwood riparian forest. Only native stands of Northern California black walnut are protected, and none were observed during multiple field visits to the biological study area. No potential habitat for the remaining 21 special-status plants was determined to be present in the biological study area.

It was determined that habitat for 22 of the 29 special-status animal species does not occur in the biological study area (Appendix A). The remaining seven special-status animal species have potential habitat present in the biological study area. These species include VELB, burrowing owl (*Athene cunicularia*), Swainson's hawk (*Buteo swansoni*), white-tailed kite (*Elanus leucurus*), purple martin (*Progne subis*), pallid bat (*Antrozous pallidus*), and Townsend's big-eared bat (*Corynorhinus townsendii*).

A survey was conducted to evaluate the extent of VELB habitat within the biological study area. These results are presented below in Table 3.7-1 and in Figure 3.7-1.

Table 3.7-1. Results of Elderberry Shrub Survey

Shrub/ Shrub Cluster #	Stem Diameter Class at Ground Level			Shrub Height (feet)	Exit Holes Present?	Shrub In Riparian Habitat?	Shrub Distance from Project Construction (feet)
	1–3 inches	3–5 inches	>5 inches				
1	5	1	3	16	No	No	<20
2	4	1	1	20	Yes	No	20–100
3	0	1	2	15	Yes	No	20–100
4	0	0	1	21	No	No	20–100
5	0	0	2	20	Yes	Yes	20–100
6	0	0	1	20	Yes	No	<20
7	4	2	1	13	No	No	>100
8	1	0	1	16	Yes	No	20–100
9	0	0	1	15	No	No	<20
10	2	0	1	13	No	No	<20
11	14	12	16	25	Yes	No	20–100
12	0	0	1	20	Yes	No	<20
13	2	0	1	12	Yes	No	<20

Native oaks and landscape tree species are present in the project area. Native species include valley oak (*Quercus lobata*) and western sycamore (*Platanus racemosa*). Landscape tree species include pin oak (*Quercus palustris*), coast redwood (*Sequoia sempervirens*), pine (*Pinus* spp.*)* locust (*Robinia* spp.), tulip tree (*Liriodendron tulipifera),* black willow (*Salix gooddingii*), and Fremont

Figure 3.7-1
Biological Conditions in the Biological Study Area

Figure 3.7-1
Biological Conditions in the Biological Study Area

Legend

- Biological Study Area
- Elderberry Shrub
- Elderberry Shrub Cluster
- Depressional Wetland (DW)

Other Waters (OW)

- Drainage Ditch
- Drainage Pipe

Community Types

- Developed/Landscaped Areas
- Great Valley Cottonwood Riparian Forest
- Ruderal Annual Grassland
- Valley Oak - Fremont Cottonwood Woodland

N

200 0 200 Feet

cottonwood (*Populus fremontii*). There are additional trees within the biological study area that occur on private property and/or will not be affected by the proposed project and thus were not evaluated for this IS.

All trees within the project area are located within City or Caltrans rights-of-way. Some of these trees are protected by the City's heritage tree ordinance (Chapter 12.64 of the Sacramento City Code). A total of 36 protected trees were identified by an arborist's survey. The protected trees in the project area are:

- 18 valley oaks with a diameter at breast height (dbh) of more than 11.5 inches.
- Six western sycamores with a dbh of more than 11.5 inches in the project area.
- 12 additional trees, other than native oak or western sycamore, with a dbh of 32 inches or greater.

Four depressional wetlands and nine drainage ditches were identified within the biological study area during a 2008 wetland delineation (Figure 3.7-1). Three of the depressional wetlands occur within the project area, and one occurs within the 100-foot buffer zone. The three depressional wetlands occurring within the project area (DW-1, DW-2, and DW-3) were delineated, encompassing a total area of 0.248 acre (see Figure 3.7-1). Dominant plant species observed in the depressional wetlands were tall flatsedge (*Cyperus eragrostis*) and dallisgrass (*Paspalum dilatatum*). Other species observed were barnyard grass (*Echinochloa crus-galli*), Johnsongrass (*Sorghum halepense*), narrowleaf cattail (*Typha angustifolia*), rough cocklebur (*Xanthium strumarium*), and bristly oxtongue (*Picris echioides*). The fourth depressional wetland, DW-4 (0.207 acre), is located outside the project area at the eastern edge of the fenced water treatment facility property on Bercut Drive and would not be encroached upon by the proposed project. The wetland is located behind a chain-link fence and was inaccessible during the site visits; however, the dominant vegetation observed through the fence consisted of narrowleaf cattail, tall flatsedge, and dallisgrass.

The biological study area contains nine drainage ditches, encompassing 0.138 acre of land (Figure 3.7-1). The drainage ditches receive hydrological input from direct precipitation and overland flow from roadside runoff and landscape irrigation runoff. The channels of the drainage ditches vary from relatively shallow to distinctly incised with a well-defined bed and bank. Two of the drainage ditches, OW-3 and OW-8, are cement-lined, and the remaining seven drainage ditches are unlined. All of the drainage ditches except OW-2, OW-4, and OW-9 contain small patches of vegetation, and the representative species observed include tall flatsedge, curly dock (*Rumex crispus*), Bermuda grass, and bristly oxtongue.

Standards of Significance

For the purposes of this analysis, a significant impact would occur if:

- The project would create a potential health hazard or involve the use, production, or disposal of materials that pose a hazard to plant or animal populations in the affected area.
- The project would result in substantial degradation of the quality of the environment or reduction of habitat or population below self-sustaining levels of threatened or endangered species of plant or animal.
- The project would affect other species of special concern to agencies or natural resource organizations (such as regulatory waters and wetlands).
- The project would violate the City's heritage tree ordinance (Chapter 12.64 of the Sacramento City Code).

Answers to Checklist Questions

a. The proposed project has a potential to result in impacts on nesting migratory birds and raptors, including Swainson's hawk, a state threatened species; white-tailed kite, a fully protected state species; and purple martin, a state species of special concern. The proposed project also has potential to affect pallid bat and Townsend's big-eared bat, both of which are state species of special concern. The proposed project would result in impacts on elderberry shrubs that provide habitat for the federally threatened VELB. A discussion of impacts on VELB habitat is provided below.

Migratory Birds and Raptors

Implementation of the proposed project could affect nesting birds, including raptors, if construction activities remove or otherwise disturb occupied nests during the breeding season. Construction activities during the breeding season that result in the death of young or loss of reproductive potential would violate California Fish and Game Code Sections 3503 and 3503.5 and the Migratory Bird Treaty Act.

Burrowing Owl

Burrowing owls were not identified occupying the site during the reconnaissance-level surveys. The site does provide some burrow habitat that could become occupied prior to project construction. If the project area or vicinity were to become occupied, there would be potential for direct or indirect impacts on this species.

No preferred burrowing owl foraging habitat would be affected by the proposed project.

Swainson's Hawk

The proposed project would not result in any direct impacts on Swainson's hawk. The proposed project would not result in the loss of any previously documented Swainson's hawk nest sites and would not result in impacts on Swainson's hawk foraging habitat because none was observed in the study area.

The proposed project does have the potential to affect Swainson's hawks if they are found to be nesting within the vicinity of the biological study area and are disturbed by project construction. Swainson's hawk would also be affected through the loss of potential nest trees in the area southeast of the I-5/Richards Boulevard interchange. This area supports several large cottonwoods, willows, and valley oaks that provide suitable nesting habitat for this species.

No suitable foraging habitat was identified within the study area and thus no foraging habitat would be affected as part of the proposed project.

White-Tailed Kite

The proposed project would not result in any direct impacts on white-tailed kite. The proposed project would not result in the loss of any previously documented white-tailed kite nest sites.

The proposed project does have the potential to indirectly affect white-tailed kites if they are found to be nesting within the vicinity of the biological study area and are disturbed by project construction. White-tailed kites would also be indirectly affected through the loss of potential nest trees in the area southeast of the I-5/Richards Boulevard interchange. This area supports several large cottonwoods, willows, and valley oaks that provide suitable nesting habitat for this species.

No suitable foraging habitat was identified within the study area and thus foraging habitat would be affected as part of the proposed project.

Purple Martin

The proposed project would not result in any direct impacts on purple martin. The proposed project would not result in the loss of any previously documented purple martin nest sites.

The proposed project does have the potential to indirectly affect purple martins if they are found to be nesting within the vicinity of the biological study area and are disturbed by project construction.

Purple martins would be indirectly affected through the loss of potential nest trees in the area southeast of the I-5/Richards Boulevard interchange. This area supports several large cottonwoods, willows, and valley oaks that provide potential nesting habitat (nest cavities if present) for this species. The underpasses within the study area do not support potential purple martin nesting habitat because there are no cavities (i.e. weep holes) on these underpasses.

Bats

No direct impacts on pallid bats or Townsend's big-eared bat are anticipated at this time because no maternity roosts sites were identified on the underpasses or within the trees within the study area during reconnaissance level surveys.

Bat species could be indirectly affected by the loss of potential roost sites in the large cottonwood, willow, and valley oaks occurring within the area southeast of the I-5/Richards Boulevard interchange.

Valley Elderberry Longhorn Beetle

Impacts on elderberry shrubs were initially determined using geographic information system (GIS) technology to overlay the locations of elderberry shrubs on a map that depicts the project footprint. Potential direct and indirect effects were further evaluated in the field by reviewing site-specific conditions and evaluating the proposed construction activities that are to take place in proximity to elderberry shrubs occurring within the biological study area. Summaries of the direct and indirect effects are presented below.

Direct Effects

As defined by the USFWS guidelines, which state that VELB habitat is directly affected if project construction requires the removal of the shrub or if ground-disturbing activities occur within 20 feet of the dripline of the shrub, the proposed project could result in potential direct effects on six shrubs (Shrubs 1, 6, 9, 10, 12, and 13; Table 3.7-1). Shrub 12 would have to be removed by transplantation for the widening of the northbound I-5 off-ramp. In addition, Shrub 1 would have soil compaction occurring within 20 feet of its dripline and therefore also would need to be removed by transplantation. The remaining four shrubs (Shrubs 6, 9, 10, and 13) occur adjacent to existing roads that would only be resurfaced as part of the proposed project. Following the policy developed by the FHWA, Caltrans, and the USFWS for VELB effects and compensation (U.S. Department of Transportation 2002), these four shrubs would not be considered directly affected by the proposed project for the reasons listed here.

- All work activity within 20 feet of the shrubs would involve only resurfacing of existing paved areas.
- No soil compaction or soil disturbance would occur within 20 feet of shrubs.
- Because the shrubs occur upslope of the road improvement areas, hydrology in the vicinity of the shrubs would not be altered because the resurfacing would not change road elevations or directions or volumes of runoff.

- The proposed project would not result in the fragmentation of existing habitats.
- The proposed project would not result in increased pedestrian access to any of these shrubs.

Detailed discussion of each of these shrubs and why they are not considered directly affected is provided below.

Shrub 6 occurs within the landscaped right-of-way between Jibboom Street and I-5. This shrub is growing on the slope of the I-5 embankment and is within 20 feet of the proposed project. Project construction on Jibboom Street would involve only resurfacing of paved areas and would not compact existing soils within 20 feet of the shrub. Shrub 6 occurs upslope of all project construction and would not be subject to any hydrologic alterations. The proposed project would not result in the fragmentation of existing habitat around this shrub because no new roadways or rights-of-way would bisect existing habitat. The proposed project would result in increased vehicle and pedestrian traffic, but such traffic would not likely increase enough to adversely affect VELB. The existing fence would remain in place during and following project construction.

Shrubs 9 and 10 occur within the landscaped right-of-way between Jibboom Street and I-5. Project construction on Jibboom Street would involve only resurfacing of paved areas and would not compact existing soils within 20 feet of the shrubs. These shrubs do not receive runoff from Jibboom Street, and thus resurfacing activities on this street would not result in altered hydrology around these shrubs.

The proposed project would not result in the fragmentation of existing habitat around these shrubs because no new roadways or rights-of-way would bisect existing habitat. The proposed project would result in increased vehicle and pedestrian traffic but would not likely increase enough to adversely affect VELB. The existing fence would remain in place during and following project construction.

Shrub 13 occurs within the landscaped median between the northbound lanes of I-5 and the northbound off-ramp at Richards Boulevard. Project construction would result only in the resurfacing of the off-ramp within 20 feet of the shrub. No soils would be compacted or disturbed within 20 feet of the shrub. Shrub 13 occurs upslope of all project construction and would not be subject to any hydrologic alterations. The proposed project would not result in the fragmentation of existing habitat around this shrub because no new roadways or rights-of-way would bisect existing habitat. The proposed project would result in increased vehicle traffic but would not likely result in adverse effects on VELB.

However, as outlined below, these shrubs (Shrubs 6, 9, 10, and 13) may be indirectly affected by project construction.

Indirect Effects

As defined by the USFWS guidelines, which state that VELB habitat is indirectly affected if project construction disturbs ground between 20 and 100 feet of an elderberry shrub's dripline, the proposed project may result in potential indirect impacts on 10 shrubs. In addition to the six shrubs identified in Table 3.7-1 occurring between 20 and 100 feet of construction, the four shrubs discussed above (Shrubs 6, 9, 10, and 13), though not considered directly affected, would be potentially indirectly affected. Possible indirect effects on VELB with the potential to occur in the biological study area include:

- Increased dust accumulation on shrubs from ground-disturbing activities.
- Changes in hydrology around shrubs.
- The removal of associated woodland species, which could result in the subsequent death of the shrub and a loss of VELB habitat.

Detailed discussion of these potential indirect effects is provided below.

Dust Accumulation

All of the shrubs except Shrubs 1, 7, and 12 (Shrubs 1 and 12 would be transplanted, and Shrub 7 is greater than 100 feet from construction), would potentially be indirectly affected by project construction because of dust accumulation. Implementation of dust control measures would minimize these effects.

Changes in Hydrology

Project construction that would occur within 100 feet of all shrubs would not likely result in altered hydrology that may adversely affect VELB. As discussed in the section titled "Direct Effects," road resurfacing activity would not alter the hydrology in the vicinity of shrubs along Bercut Drive and Jibboom Street. Shrubs 6, 8, 9, 10, 11, and 13 occur upslope of existing paved surfaces, which would be resurfaced as part of the proposed project. The resurfacing would not change road elevations or directions or volumes of runoff, and thus would not result in changes in hydrology within the vicinity of these shrubs.

Shrub 5 is downslope of Jibboom Street. However, the road resurfacing of Jibboom Street would not alter the existing storm drain system that routes road runoff to the north, away from Shrub 5.

Shrubs 2, 3, 4, and 13 would have grading activity that would disturb soils within 100 feet of their driplines. These shrubs are located upslope of project grading activity and thus would not likely be indirectly affected by hydrologic alterations resulting from changes in topography or volumes and directions of runoff downslope of the shrubs.

Removal of Associated Woodland Species

The removal of associated woodland tree and shrub species (including Shrub 12) within the median between the northbound I-5 off-ramp and Bercut Drive would not likely indirectly affect Shrub 13. Shrub 13 occurs within 100 feet of this construction area but is currently separated from this habitat by the existing two-lane off-ramp. No associated woodland species provide cover or dispersal linkages between Shrubs 12 and 13, and thus the removal of these associated species would not likely indirectly affect Shrub 13. These shrubs are approximately 150 feet apart and separated by pavement. However, the removal of Shrub 12 may indirectly affect Shrub 13 by isolating it to some degree from similar breeding habitat, and by removing a source of breeding individuals potentially occurring in Shrub 12.

Mitigation Measures 3.7-1 through 3.7-5, discussed in the section titled "Mitigation Measures," would reduce the proposed project's potential impacts on migratory birds, elderberry shrubs, burrowing owls, nesting Swainson's hawks, and roosting bats, respectively, to a less-than-significant level.

b. The proposed project would potentially result in impacts on 36 trees protected by the City's heritage tree ordinance (Chapter 12.64 of the Sacramento City Code). Because the proposed project has not reached final design, the exact extent of impacts on protected trees has yet to be determined. Once they are determined, Mitigation Measure 3.7-6 would help to reduce any impacts to protected trees to a less-than-significant level.

c. A total of 0.386 acre of potential waters of the U.S. (0.248 acre of wetlands and 0.138 acre of waters [drainage ditches]), under the jurisdiction of the U.S. Army Corps of Engineers (USACE), were identified within the biological study area. These potential waters of the U.S. were mapped as part of a wetland delineation prepared for the proposed project. The delineation was submitted to the USACE on June 30, 2009 for verification. The proposed project would result in an impact on a total of 0.054 acre of these potential waters of the U.S. (0.027 acre of depressional wetlands and 0.027 acre of drainage ditch). Mitigation Measure 3.7-7 would reduce this impact to a less-than-significant level; however specific mitigation measures will also be defined by the USACE during the permitting process.

Mitigation Measures

The proposed project has a potential to have an impact on migratory birds, VELB, burrowing owl, Swainson's hawk, white-tailed kite, purple martin, pallid bat, and Townsend's big-eared bat.

Implementation of the following mitigation would reduce the potential impact on these species to a less-than-significant level.

Mitigation Measure 3.7-1: Avoid and Minimize Impacts on Migratory Birds and Raptors, Including White-Tailed Kite and Purple Martin

In order to avoid and minimize potential impacts on nesting migratory birds and raptors, including white-tailed kite and purple martin, the following measures will be implemented.

- Shrub and tree removal and construction activities are to be conducted during the non-nesting season (September 1 through January 31) whenever feasible.
- If shrub and tree removal or construction activities occur during the nesting season (between February 1 and August 31), a qualified biologist will conduct a nesting survey of all habitat within 100 feet of the construction area for migratory birds and within 500 feet of the construction area for raptor habitat (large trees). Surveys will be conducted no less than 14 days and no more than 30 days prior to commencement of construction activities, and surveys will be conducted in accordance with the California Department of Fish and Game (CDFG) protocol as applicable. If no active nests are identified on or within 500 feet of the construction site, no further mitigation is necessary. This survey can be carried out concurrently with surveys for other species provided it does not conflict with any established survey protocols. A copy of the preconstruction survey will be submitted to the City.
- If an active bird nest is identified within the described survey areas (out to 100 feet from construction area for migratory birds and out to 500 feet for raptors), a 500-foot no-disturbance buffer zone will be established between the nest and construction activity. The buffer zone may be reduced in consultation with the CDFG if it is determined that project activities won't cause the nest to fail.
- Completion of the nesting cycle will be determined by a qualified ornithologist or biologist.

Mitigation Measure 3.7-2: Avoid, Minimize, and Mitigate for Impacts on Valley Elderberry Longhorn Beetle

The measures presented below are also being put forth in an Endangered Species Act Section 7 biological assessment being prepared for impacts on VELB. Caltrans, in conjunction with the FHWA, will be consulting with the USFWS on the proposed project's impacts on VELB.

Implementation of the following measures will avoid and minimize impacts on VELB that could occur in 10 elderberry shrubs that could be indirectly affected by project construction. These measures are from the USFWS's *Conservation Guidelines for the Valley Elderberry Longhorn Beetle, 9 July 1999* (VELB Guidelines).

Avoidance and Minimization Measures

Establish a Minimum 20-Foot-Wide Buffer around All Elderberry Shrubs Where Feasible

Before any ground-disturbing activity, the City will ensure that a minimum 4-foot-tall temporary, plastic mesh–type construction fence (Tensor Polygrid or equivalent) is installed at least 20 feet from the driplines of elderberry shrubs that will be retained adjacent to the biological study area. This fencing is intended to prevent encroachment by construction vehicles and personnel. The exact location of the fencing will be determined by a qualified biologist, with the goal of protecting habitat for VELB.

The fencing will be strung tightly on posts set at a maximum interval of 10 feet. The fencing will be installed in a way that prevents equipment from enlarging the work area beyond the delineated work area. The fencing will be checked and maintained weekly until all construction is completed. This buffer zone will be marked by signs stating:

> This is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment.

Signs will be placed at intervals of 50 feet and must be readable at a distance of 20 feet.

No construction activity, including grading, will be allowed until this condition is satisfied. No grading, clearing, storage of equipment or machinery, or other disturbance or activity may occur until a representative of the City has inspected and approved all temporary construction fencing. The fencing and a note reflecting this condition will be shown on the construction plans.

Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel

Before any work occurs in the project area, including grading, a qualified wildlife biologist will conduct mandatory contractor/worker awareness training for construction personnel. The training will be provided to all construction personnel to brief them on the need to avoid impacts on biological resources and the penalties for not complying with biological mitigation requirements. If new construction personnel are added to the proposed project, the contractor's superintendent will ensure that the new personnel receive the mandatory training before starting work. An environmental awareness handout will be provided to each person, describing and illustrating sensitive resources (i.e., nesting birds and raptors, elderberry shrubs, and native trees) that will be avoided during project construction and identifying all relevant permit conditions.

Implement Dust Control Measures

The City will ensure that dust control measures are implemented for all ground-disturbing activities in the project area. These measures may include application of water to graded and disturbed areas that are unvegetated; however the City or its contractor may use other measures more appropriate for site-specific conditions, as long as dust is minimized to the maximum extent practicable To avoid attracting Argentine ants, at no time will water be sprayed within the driplines of elderberry shrubs.

Pursuant to the USFWS VELB Guidelines, the City will implement the following measures to mitigate for the direct and indirect impacts on VELB identified above.

Compensatory Mitigation

Transplant Directly Affected Elderberry Shrubs

All shrubs that are directly affected by the proposed project will be transplanted to a USFWS-approved conservation area. At the USFWS's discretion, a plant that is unlikely to survive transplantation because of poor condition or location, or a plant that would be extremely difficult to move because of access problems, may be exempted from transplantation.

A qualified biological monitor will be on the site for the duration of the transplanting of elderberry shrubs to ensure that no unauthorized take of VELB occurs. If unauthorized take does occur, the monitor will have the authority to stop work until corrective measures have been completed. The monitor must immediately report any unauthorized take of the beetle or its habitat to the USFWS.

Elderberry shrubs will be transplanted when the plants are dormant, approximately November through the first two weeks in February, after they have lost their leaves. Transplanting during the non-growing season will reduce shock to the plant and increase transplantation success. The City will follow the specific transplanting guidance provided in the USFWS VELB Guidelines.

Shrubs 1 and 12 are recommended for transplantation. All other shrubs within the biological study area appear to be healthy and provide potential and known occupied habitat for VELB (Shrubs 2, 3, 5, 6, 8, 11, 12, and 13 were observed with exit holes). Therefore, they are not believed to warrant transplantation.

As discussed above, all the other elderberry shrubs occurring within 20 feet of project construction would have only resurfacing activities occurring within 20 feet of their driplines and thus would not be directly affected (i.e., no root zone damage, no soil compaction, and no altered hydrology). It is believed that existing traffic levels and maintenance activities are not precluding VELB from currently occupying this habitat, especially because all of the shrubs appear to be volunteers occurring in landscaped areas in non-riparian habitat, except for Shrub 5, which occurs in riparian habitat along the Sacramento River. Because the proposed project is not going to result in a change in the type of land use and activity currently occurring in the biological study area, it is believed that leaving the shrubs in place would not adversely affect VELB, if the avoidance and minimization measures identified above are implemented. Furthermore, it is believed that maintaining these shrubs in their current locations provides habitat linkages between VELB populations along the American and Sacramento Rivers and further serves to maintain the species' range.

Compensate for Direct Impacts on Elderberry Shrubs

As discussed above, Shrubs 1 and 12 would be directly affected by the proposed project. According to the USFWS VELB Guidelines, adversely affected shrubs that are "transplanted or destroyed" should be mitigated for according to the measures outlined in Table 1 of the USFWS VELB Guidelines. The City will mitigate for impacts on the shrubs by purchasing mitigation credits at a USFWS-approved mitigation bank. A summary of the required mitigation is provided in

Table 3.7-2. As shown in the table, the proposed project would require 22 elderberry seedlings and 28 associated native plants (six VELB credits) to be planted at a USFWS-approved mitigation bank. Currently, VELB mitigation credits are available at French Camp Conservation Bank. The shrubs identified for transplantation will be transplanted to this mitigation bank.

Table 3.7-2. Compensation for Impacts on VELB Habitat

Location	Stem Diameter Class at Ground Level in Centimeters (inches)	Exit Holes?	Stem Count	Elderberry Seedling Ratio	Associated Native Plant Ratio	Total Elderberry/ Associated Natives to Be Planted
Non-riparian	2.5–7.6 (1–3)	No	5	1:1	1:1	5/5
		Yes	0	2:1	2:1	0/0
Non-riparian	7.6–12.7 (3–5)	No	1	2:1	1:1	2/2
		Yes	0	4:1	2:1	0/0
Non-riparian	>12.7 (>5)	No	3	3:1	1:1	9/9
		Yes	1	6:1	2:1	6/12
Riparian	2.5–7.6 (1–3)	No	0	2:1	1:1	0/0
		Yes	0	4:1	2:1	0/0
Riparian	7.6–12.7 (3–5)	No	0	3:1	1:1	0/0
		Yes	0	6:1	2:1	0/0
Riparian	>12.7 (>5)	No	0	4:1	1:1	0/0
		Yes	0	8:1	2:1	0/0
Total	–	–	**10**	–	–	**22/28**

Mitigation Measure 3.7-3: Avoid and Minimize Impacts on Burrowing Owl

To avoid and minimize potential impacts on burrowing owls, the following measures will be implemented.

Preconstruction surveys for burrowing owls will be conducted in accordance with *Burrowing Owl Survey Protocol and Mitigation Guidelines* (The California Burrowing Owl Consortium 1993), which calls for surveying out to 500 feet from project limits where suitable habitat is present. If owls are identified in the biological study area, mitigation measures will be implemented as outlined in the CDFG's 1995 *Staff Report on Burrowing Owl Mitigation* (California Department of Fish and Game 1995). These measures will include those listed here.

- If occupied owl burrows are found within the biological study area, a determination will be made by a qualified biologist in consultation with the CDFG regarding whether work will affect the occupied burrows or disrupt reproductive behavior.
- If it is determined that construction will affect occupied burrows during August through February, the subject owls will be passively relocated from the occupied burrow(s) using one-way doors. One-way doors will be in place for a minimum of 48 hours before burrows are excavated.
- If it is determined that construction will physically affect occupied burrows or disrupt reproductive behavior during the nesting season (March through July), avoidance is the only mitigation available. Construction will be

delayed within 300 feet of occupied burrows until it is determined that the subject owls are not nesting or until a qualified biologist determines that juvenile owls are self sufficient or are no longer using the natal burrow as their primary source of shelter.

Mitigation Measure 3.7-4: Avoid and Minimize Impacts on Swainson's Hawk

If construction occurs during the breeding season (February 1–August 31), the City will conduct CDFG-recommended protocol-level surveys within 0.8 kilometer (0.5 mile) of the project area prior to construction as required by the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (Swainson's Hawk Technical Advisory Committee 2000) or as required by the CDFG in the future. If no active nests are identified during the survey, no additional mitigation is required.

If active nests are found in the vicinity of the construction area, mitigation measures consistent with the *Staff Report Regarding Mitigation for Impacts to Swainson's Hawks (Buteo swainsoni) in the Central Valley of California* (California Department of Fish and Game 1994) will be incorporated in the following manner or as directed by the CDFG.

- If an active nest is found, no intensive new disturbances (e.g., construction activities that create sudden loud noises or vibrations) or other project-related activities that may cause nest abandonment or forced fledging, can be initiated within 200 yards (buffer zone) of an active nest between March 1 and September 15. The size of the buffer area may be adjusted if a qualified biologist and the CDFG determine it would not be likely to have adverse effects on the hawks. No project activity will commence within the buffer area until a qualified biologist confirms that the nest is no longer active.
- Active nest trees (nest trees currently occupied or trees supporting a nest within the last five years) will not be removed unless there is no feasible way of avoiding removal of the tree. If a nest tree must be removed, a management authorization (including conditions to offset the loss of the nest tree) must be obtained from the CDFG with the tree removal period specified; it is generally between October 1 and February 1.
- If construction or other project-related activities that may cause nest abandonment or forced fledging are necessary within the buffer zone, monitoring of the nest site (funded by the project proponent) by a qualified biologist will be required to determine if the nest is abandoned. If the nest is abandoned and if the nestlings are still alive, the project proponent will fund the recovery and hacking (controlled release of captive reared young) of the nestling(s).
- Routine disturbances, such as routine maintenance activities within 0.4 kilometer (0.25 mile) of an active nest, will not be prohibited unless consultation with the CDFG determines that these activities will affect the active nest.

Mitigation Measure 3.7-5: Avoid and Minimize Impacts on Bats

Prior to the removal of any trees, the City will conduct a preconstruction survey to determine if roosting bats are present. The surveys should be conducted 1 week prior to the start of construction at dusk, when bats would be expected to be present and active. This survey will be conducted by a wildlife biologist qualified to identify the species of bats using these roosts. Surveys will be conducted using an ultrasonic bat detector (such as AnaBat or SonoBat) to determine the presence of bats within the biological study area. Detectors will be positioned in the immediate vicinity of trees deemed to be suitable for roosting by the biologist. If the preconstruction surveys determine that no bats are roosting within the biological study area, no further mitigation is required.

If roosting bats are present, the biologist will determine if the roost is a day roost or is a maternal roost. If the roost is determined to be a maternal roost, construction activities that may cause the abandonment of the maternal roost or cause harm to bats will be prohibited until the biologist determines that the bat pups have left the roost and are able to fend for themselves. Specific activities that may cause the abandonment of an identified maternal roost will be defined based on site-specific conditions around the roost during consultation with CDFG. If the roost is determined to be a day roost, normal construction activities should not be prohibited. It is believed that day roosting bats occurring there are already acclimated to high levels of noise and disturbance associated with current vehicle traffic on I-5 and car, pedestrian traffic, and maintenance activities on the adjacent roadways.

Mitigation Measure 3.7-6: Avoid and Minimize Impacts on Protected Trees

Redesign the Proposed Project to Avoid and Minimize Impacts on Protected Trees

The City will revise the project design to the extent feasible to avoid disturbing or removing protected trees.

Implement Protective Measures for Protected Trees Preserved On the Site

For protected trees that will be preserved and integrated into the project design (i.e., trees that will not be disturbed or removed), the City will implement the measures described here in the project design and during construction.

- Any unnecessary impacts on protected trees (e.g., construction activities within driplines) will be avoided through design.
- Protective fencing will be installed before any project grading or trenching 30 centimeters (1 foot) outside the driplines of trees to be avoided. The fencing will not be removed until construction is completed.
- No dumping of chemicals or use of herbicides will be allowed within the driplines of the preserved trees. No fill will be placed within the driplines of preserved trees without properly designed tree wells that incorporate porous material or aerating tile.
- Any unavoidable trenching within the driplines of the preserved trees will be dug by hand to minimize damage to the root system.

- No signs or other attachments will be hung on the trunks or limbs of preserved trees.
- Any required pruning of limbs or roots from preserved trees will be performed under the direction of a certified arborist and will follow the pruning standards of the Western Chapter of the International Society of Arboriculture.
- The project proponent will ensure that no paving is allowed within the driplines of trees to be preserved.
- The project proponent will ensure that no irrigation system is installed in such a manner that the ground within the driplines of preserved trees is irrigated.
- Irrigation and other potential sources of runoff associated with the constructed project will be diverted away from preserved trees. The project proponent will demonstrate that any new drainage patterns do not divert surface water toward the dripline of preserved trees.
- Landscape design within the dripline of preserved trees will be minimized and will include only native plant species requiring no more than once monthly watering when established.
- Compliance with the City of Sacramento Tree Ordinance (Chapter 12.64 of the Sacramento City Code).

Mitigation Measure 3.7-7: Avoid, Minimize, and Mitigate for Impacts on Wetlands and Waters

Redesign the Proposed Project to Avoid and Minimize Impacts on Wetlands and Other Waters
If the USACE determines that the depressional wetlands and drainage ditches are waters of the United States, the City will revise the project design to avoid affecting waters of the United States to the extent feasible.

Obtain and Comply with Federal and State Permits and Requirements
If the USACE decides that the depressional wetlands and drainage ditches are waters of the United States and, therefore, under its jurisdiction, the City will obtain a CWA Section 404 permit from the USACE for the placement of fill within waters of the United States and Section 401 certification from the Regional Water Quality Control Board (RWQCB). If the USACE determines that the depressional wetlands and drainage ditches are not waters of the United States, the City will not need to obtain a CWA Section 404 permit, but will need to obtain waste discharge requirements (WDRs) from the RWQCB.

All conditions that are attached to the Section 404 and 401 permits or WDRs will be implemented as part of the proposed project. The conditions will be clearly identified in construction plans and specifications and monitored during and after construction to ensure compliance.

Compensate for Permanent Loss of Depressional Wetland Habitat
The City will compensate for permanent impacts on waters of the United States (including wetlands) and waters of the state to ensure there is no net loss of habitat functions and values. The compensation will be determined as part of the state (Section 401 water quality certification or WDRs) and federal (Section 404 nationwide permit) processes and may be a combination of offsite restoration/creation and mitigation credits. Compensation ratios will be a minimum of 1:1 (1 acre of mitigation for every 1 acre of impact). Ratios will be based on site-specific information and determined through coordination with state and federal agencies as part of the permitting process.

Findings

The proposed project has potential to affect migratory birds, including white-tailed kite and purple martin. Implementation of Mitigation Measure 3.7-1 would reduce the impact on white-tailed kite and purple martin to a less-than-significant level.

The proposed project would result in impacts on 12 elderberry shrubs that provide habitat for the federally threatened VELB. Implementation of Mitigation Measure 3.7-2 would reduce the impact on VELB to a less-than-significant level.

The proposed project has potential to affect burrowing owls and would require the implementation of Mitigation Measure 3.7-3 to reduce the impact on burrowing owls to a less-than-significant level.

The proposed project has potential to affect nesting Swainson's hawks. Implementation of Mitigation Measure 3.7-4 would reduce the impact on nesting Swainson's hawks to a less-than-significant level.

The proposed project has potential to affect roosting bats. Implementation of Mitigation Measure 3.7-5 would reduce the impact on roosting bats to a less-than-significant level.

The proposed project would result in an impact on protected trees. Implementation of Mitigation Measure 3.7-6 would reduce the impact on protected trees to a less-than-significant level.

The proposed project would result in impacts on 0.027 acre of depressional wetlands and 0.027 acre of drainage ditches. Implementation of Mitigation Measure 3.7-7 would reduce the impact on depressional wetlands and drainage ditches to a less-than-significant level.

	Impact for Which the General Plan MEIR Mitigates to a Less-than-Significant Level	Potentially Significant Impact That Requires Analysis in an EIR	Potentially Significant Impact Unless Mitigated	Less-than-Significant Impact
3.8 Energy. Would the proposed project:				
a. Result in impacts on power or natural gas?	☐	☐	☐	☒
b. Use nonrenewable resources in a wasteful and inefficient manner?	☐	☐	☐	☒
c. Result in a substantial increase in demand for existing sources of energy or require the development of new sources of energy?	☐	☐	☐	☒

Environmental Setting

The project area includes energy infrastructure serving the City of Sacramento. Overhead utility lines are in the project area, as is a small electrical substation.

Utility relocations would be required for construction of the project. Although the specific needs for any utility relocation would not be defined until the final design of the project, the relocations are expected to be within the areas evaluated in this initial study. Continuous utility service during construction would be required of the contractors.

Pending coordination with the utility companies, the existing overhead utilities located in the retention basin adjacent to the I-5 northbound off-ramp would be relocated within the basin to accommodate the widening of the northbound off-ramp. Additionally, if the existing overhead utilities located on Jibboom Street, in the asphalt sidewalk adjacent to I-5 and east of the Robert T. Matsui Waterfront Park and the proposed Science Museum, are relocated underground, Jibboom Street would be shifted toward I-5, and on-street parking would be added to portions of the west side. If these utilities remained on overhead poles, the existing asphalt sidewalk would be maintained with the poles in their existing locations, and on-street parking would not be added to the west side of Jibboom Street. Furthermore, to accommodate the widening of the southern portion of Jibboom Street and the construction of the Railyards Boulevard/Jibboom Street intersection, the existing overhead utilities, located on the east side of the southern portion of Jibboom Street, would need to be relocated. Further coordination with the utility companies is required to determine their new location.

The proposed project would accommodate growth and would use nonrenewable resources in its construction.

Standards of Significance

For the purposes of this analysis, a significant impact would occur if:

- The project would require or result in the construction of new, or the expansion of existing, natural gas or electric facilities, the construction of which would cause significant environmental effects.

Answers to Checklist Questions

a. As stated above, utility relocations would be required for construction of the project, but the relocations are expected to be within the areas evaluated in the IS/MND. As part of the proposed project, the City would coordinate with utility providers with infrastructure in the area and incorporate all available methods to avoid and minimize disruptions of utility service into its final construction plans. No substantial disruption of service is anticipated. This impact would be less than significant.

b. While the proposed project would use nonrenewable resources for its construction, the *Sacramento 2030 General Plan* includes several policies related to the preservation of nonrenewable resources during construction activities, including Policies U 5.1.15 and U 5.1.16. In addition, the General Plan includes Policies U 6.1.6 through U 6.1.8, which focus on promoting the use of renewable resources during the long-term operation of City projects. Through adherence to these General Plan policies, the proposed project's impact on non-renewable resources would be less than significant.

c. The proposed project is a component of the larger *Sacramento 2030 General Plan*, the RSP, and the Richards Boulevard Redevelopment Area plan. The project would not directly induce substantial growth in the project area because no residences or commercial uses are planned as part of the proposed project. As noted in the project description, the project accommodates previously planned growth and; therefore, would not result in the increased use of energy. However, given the coordinated growth mechanisms in place, the project is unlikely to substantially encourage unplanned development in the study area or to shift or hasten planned growth in and around the study area, creating a substantial unplanned increase in demand of existing sources of energy or requiring the unplanned development of new sources of energy. This impact would be less than significant.

The growth is consistent with the approved land use plans for the area, and the corresponding energy demand would also be consistent with approved plans for the area. This impact would be less than significant.

Mitigation Measures

No mitigation measures would be required.

Findings

The proposed project's impacts on energy would be less than significant.

	Impact for Which the General Plan MEIR Mitigates to a Less-than-Significant Level	Potentially Significant Impact That Requires Analysis in an EIR	Potentially Significant Impact Unless Mitigated	Less-than-Significant Impact
3.9 Hazards. Would the proposed project involve:				
a. A risk of accidental explosion or release of hazardous substances (including oil, pesticides, chemicals, or radiation)?	☐	☐	☐	☒
b. Possible interference with an emergency evacuation plan?	☐	☐	☐	☒
c. The creation of any health hazard or potential health hazard?	☐	☐	☒	☐
d. Exposure of people to existing sources of potential health hazards?	☐	☐	☒	☐
e. Increased fire hazard in areas with flammable brush, grass, or trees?	☐	☐	☐	☒

Environmental Setting

The information provided in this section is based on the *Initial Site Assessment, Richards to Railyards Access Improvement Project* (Blackburn Consulting 2008) and the *Draft Aerially Deposited Lead/Phase II Assessment, Railyard to Richards Boulevard Access Improvement Project* (Blackburn Consulting 2009b), both prepared by Blackburn Consulting (BCI).

Within the project site, BCI identified two sites, the historic PG&E power station and the Jibboom Junkyard, with known and potentially uncharacterized near-surface soil contamination. Both of these two sites have required environmental remediation under the supervision of the U.S. Environmental Protection Agency (EPA) and the California Department of Toxic Substances Control (DTSC) (Blackburn Consulting 2008).

The historic PG&E power station site is located on Jibboom Street and is immediately west of I-5. This site was formerly a portion of a scrap metal recycling facility. The soils on site are contaminated with total petroleum hydrocarbons (TPH) and lead. In December 1997, the DTSC and the Department of Water Resources (DWR) signed an interagency agreement to complete the remedial action plan (RAP) and certification of the site under the Voluntary Cleanup Program (Blackburn Consulting 2008). The RAP required containment of the waste by an engineered earthen cap, which is still in place and serves as a barrier to contaminant migration (California Department of Toxic Substances Control 1998). Approximately 0.75 acre has been capped, and 2.5 acres have been released for commercial or industrial reuse only. In 1998, a covenant was filed to restrict excavation or activities that disturb the soil at any depth without approval, and a deed restriction was recorded. The site was certified complete in 1998 and the DTSC signed an operation and maintenance agreement with the RWQCB regarding the monitoring of the future construction on the site. The site is discussed in the 2007 Discretionary Five-Year Review Report for the Jibboom Junkyard prepared by the EPA (2007) (Blackburn Consulting 2008).

The Jibboom Junkyard is located on Jibboom Street, on the east bank of the Sacramento River, and west of I-5. The site covers 9 acres, 6.7 acres of which are covered by I-5 and present-day Jibboom Street. Formerly the Associated Metals Company salvage yard, the remaining 2.3 acres, consisting of relatively flat open field, have since been converted into the Robert T. Matsui Waterfront Park. Approximately 8 to 10 feet of clean soil has been added to the park site to raise it to the elevation of the existing levee (Blackburn Consulting 2008). In 1981, the Jibboom Junkyard was identified as being contaminated with copper, lead, polychlorinated biphenyls (PCBs), and zinc. Because of the high levels of contamination, the site was added to the EPA's National Priorities List (NPL). In 1991, the site was formally deleted from the NPL because all EPA-specified cleanup goals had been met, institution controls were place, and all required reports and records were completed. The site was also considered available for unrestricted access, and no 5-year review was required. However, EPA Region IX elected to complete a discretionary 5-year review after the City approved preliminary development plans that could change land use in the vicinity to residential (Blackburn Consulting 2008).

The ISA also determined that the following service station sites immediately adjacent to the project site had potential soil or groundwater contamination due to petroleum hydrocarbons:

- Chevron Service Station.
- Texaco and Valero (formerly Arco) Service Stations. The Phase II assessment determined that the Texaco and Valero stations were determined to be low risk sites by the Sacramento County Environmental Management Department (Blackburn Consulting 2009).
- The Shell Station has documented petroleum hydrocarbon impacts on soils and groundwater, and recent monitoring (January 2009) of this site detected the presence of total purgeable petroleum hydrocarbons, methyl tert-butyl ether (MTBE), and tert-butyl alcohol (TBA) (Blackburn Consulting 2009). Ongoing groundwater monitoring is currently underway by Wayne Perry Inc. on behalf of Equilon Enterprises LLC (dba Shell Oil Products USA) (Patton pers. comm.).

The RSP area (a former federal Superfund site) lies in the southern portion of the project site. The UPRR has been designated the responsible party for this former 240-acre Southern Pacific Transportation Company Railyard site. Extensive soil and ground water remediation efforts have transpired and are currently occurring within the RSP area. A small portion of the project site is located within the northwest portion of RSP area. However, the majority of the contamination has occurred east of the proposed project site boundaries (Blackburn Consulting 2008).

The site assessments also documented the following general contamination and hazardous waste materials in the project area:

- Yellow traffic stripes on the existing road surface have the potential to contain lead and chromium at concentrations in excess of the hazardous waste thresholds developed by the California Code of Regulations.
- Aerially deposited lead (ADL), which is a result of the historical use of leaded gasoline and associated exhaust emissions, has been found to occur in soils adjacent to highways. Caltrans has a variance with the DTSC for addressing lead contamination within their right-of-way.
- Asbestos-containing materials (ACM), such as asbestos-containing pipes used to convey water, are located under the sidewalks along Richards Boulevard beneath the elevated freeway. Furthermore, under the I-5/Richards interchange, asbestos-containing 4-inch pipes beneath the sidewalks on the corner of Richards Boulevard and the I-5 northbound on ramp and I-5 southbound off ramp would be removed during construction (Roccanova pers. comm.).

Standards of Significance

For the purposes of this analysis, a significant impact would occur if:

- The project would expose people (e.g., residents, pedestrians, and construction workers) to existing contaminated soil during construction activities.
- The project would expose people (e.g., residents, pedestrians, and construction workers) to asbestos-containing materials.
- The project would expose people (e.g., residents, pedestrians, and construction workers) to existing contaminated groundwater during construction or dewatering activities.

Answers to Checklist Questions

a. The proposed project would involve access improvements to the I-5/Richards Boulevard interchange. This project would not directly generate or involve the routine transfer of hazardous materials. Small quantities of commonly used materials, such as fuels and oils, would be temporarily used during construction to operate construction equipment. The project would comply with applicable local, state, and federal regulations governing hazardous waste. The proposed project's impact in regard to an explosion or accidental release of hazardous substances would be less than significant.

b. Short-term lane closures or slight detours during project construction may be required and would have the potential to interfere with the implementation of emergency response plans. To prevent interference with emergency response, the City requires all development projects to prepare traffic management plans (TMPs) for construction activities as required by sections 12.20.020 and 12.20.030 of the Sacramento City Code. Accordingly, as described in Section 2, "Project Description," a project-specific TMP would be implemented as part of the proposed project. Because the TMP would address traffic management during construction and would require that access be maintained during all phases of construction, the project would not result in interference with an emergency response plan.

c., d. As noted above, during the ISA, BCI determined that the historic PG&E power station and the Jibboom Junkyard were potential sources of uncharacterized near-surface soil contamination within the proposed project site (Blackburn Consulting 2008).

In regard to the Jibboom Junkyard, the *2007 Discretionary Five-Year Review Report for the Jibboom Junkyard* prepared by the EPA notes that substantial soil contamination of lead and PCB in the Caltrans right-of-way was unlikely. However this conclusion was not confirmed by sampling. Additionally, the EPA, recommended in this report that "Caltrans document a management procedure to notify workers that this section of [right-of-way] was a superfund site, with some potential for encountering subsurface contamination" (Blackburn Consulting 2008). BCI noted that this statement refers to the existing Jibboom Street, I-5, and Bercut Drive east of the area formally included in the Jibboom Junkyard cleanup, which did not investigate or clean up the entire junkyard site (Blackburn Consulting 2008).

A limited Phase II subsurface investigation was conducted for the proposed project in late spring 2009 to verify whether contaminants within the historic PG&E power station and the Jibboom Junkyard existed. To analyze the presence of organic compounds, four 10-foot boring samples were taken within the boundaries of these two sites. Only an insignificant amount of one constituent, motor oil range petroleum hydrocarbons, was detected. Priority metals testing was also conducted. However, with the exception of lead, the concentrations appear to be within expected ranges for naturally occurring background levels of these elements. Lead concentrations in two samples appeared to be slightly to moderately elevated compared to expected background. However, these lead levels are still below the California hazardous waste criteria (Blackburn Consulting 2009b). Given the depth of proposed project improvements within the historic PG&E power station and the Jibboom Junkyard sites (up to 7 feet below ground surface), there is still a potential to encounter previously unidentified contamination. Exposure of the public to these existing sources of hazardous materials would be a significant impact. Implementation of Mitigation Measure 3.9-1 would reduce the impact to a less-than-significant level.

Based on the results of the Phase II investigation, grading and resurfacing along Jibboom Street could encounter groundwater at relatively shallow depth (within 3-5 feet of ground surface). As noted above, recent groundwater monitoring data from the Shell Station suggests that contaminated groundwater extends under Jibboom Street along the western boundary of the site. If dewatering is required within this area, contaminated groundwater is likely to be encountered (please refer to Section 3.4 “Water” for a more detailed discussion on the potential for dewatering), exposing construction workers and the public to a potential health hazard. If contaminated groundwater is encountered, proper coordination with the station’s owner and the regulatory oversight agency would also be necessary (Blackburn Consulting 2009). With implementation of the requirements of the hazardous materials treatment and compliance plans described in Mitigation Measure 3.9-1, the impact of exposing people to existing sources of potential health hazards would be reduced to a less-than-significant level.

As noted above, extensive soil and groundwater remediation on the former 240-acre Southern Pacific Transportation Company Railyard site has occurred. Per e-mail correspondence on September 9, 2008 between the DTSC and Thomas Enterprises Inc., the land owners of the RSP area, the DTSC confirmed that;

> impacted soils beneath and adjacent to the location of Bercut Avenue on Railyards property (in the northwestern part of the property, adjacent to Interstate Highway 5 (I-5), and the area of Railyards Blvd. between Bercut and Jibboom Street) were removed as part of DTSC-approved remedial measures, and that the soils remaining in place meet the health protective standards for construction workers. In addition, this is not an area of the site with significant residual volatile organic compound (VOC) contaminants in soil or groundwater. Therefore, no special health and safety requirements are necessary for the protection of contractors or construction workers performing work in this area.

The ISA found that no special health and safety requirements are necessary for this portion of the project site; if any unanticipated site conditions are discovered, coordination with the DTSC would be required (Blackburn Consulting 2008).

The project site also contains general contamination and hazardous waste issues such as yellow traffic stripes, ADL, and ACMs. Project construction would result in the removal of yellow striping. Project excavation and soil-disturbing activities could encounter lead contamination in the soils. Under the I-5/Richards interchange, the sidewalks located on the corner of Richards Boulevard and the I-5 northbound onramp and I-5 southbound off ramp contain asbestos-containing 4-inch pipes, which would both be removed during construction (Roccanova pers. comm.). As such, construction of the proposed project would result in ground-disturbing activities that could expose people to sources of potential health hazards related to these hazardous materials. With implementation of Mitigation Measure 3.9-1, listed below, this potential impact would be reduced to a less-than-significant level.

Per the Phase II assessment findings and Caltrans’ initial review of the associated soil test results for both total and soluble lead, Caltrans is requiring additional lead testing of existing samples. If the soil from these additional tests cannot be characterized as “non-hazardous”, a Caltrans lead variance with the DTSC (Variance No. V09HQSCD006, dated July 1, 2009) would be invoked for this project (Blackburn Consulting 2009b). This variance details the specific conditions, limitations, and other requirements that Caltrans would need to comply with for the handling and disposition of lead-contaminated soils within its right-of-way. The project would also comply with the City's General Plan policies, and applicable local, state, and federal regulations governing hazardous waste. As such, with implementation of Mitigation Measure 3.9-1, the impact of exposing people to existing sources of potential total and soluble lead health hazards would be reduced to a less-than-significant level.

e. Fire safety BMPs would be used in construction operations. The City follows a standard practice of developing and implementing a fire risk management plan that addresses fire-suppression equipment and procedures to be used during construction and training of construction and maintenance crews. Fire-suppression equipment and materials would be kept adjacent to all areas of work and in stockpile areas and would be clearly marked. Detailed information for responding to fires would be provided in the project's fire risk management plan. Information contained in the plan and the locations of fire-suppression materials and equipment would be included in the employee environmental training. The proposed project would not expose people or structures to a significant loss, injury, or death attributable to fires in excess of existing conditions. This impact is less than significant.

Mitigation Measures

Mitigation Measure 3.9-1: Comply with the recommendations of the Health and Safety Plan, Lead Compliance Plan, and Asbestos Abatement Plan developed by the City for the project and approved by the appropriate agencies.

Given the history of soil and groundwater contamination within the project site, there is a potential to encounter known and previously unidentified contamination. As such, an appropriate health and safety plan will be prepared to protect construction workers and the public from potential health hazards.

The proposed project requires the removal of yellow traffic striping. The City will do so in compliance with DTSC guidelines, which includes development of an appropriate lead compliance plan.

In addition, two asbestos-containing pipes would be demolished in the course of project construction activities. An appropriate asbestos abatement plan would be developed, and all abatement work would be completed using a contractor certified by the California Department of Health Services (Blackburn Consulting 2008).

Findings

The project has the potential to expose people to existing contaminated soil and groundwater during construction activities. Implementation of Mitigation

Measure 3.9-1 would reduce impacts on human health and safety to a less-than-significant level.

	Impact for Which the General Plan MEIR Mitigates to a Less-than-Significant Level	Potentially Significant Impact That Requires Analysis in an EIR	Potentially Significant Impact Unless Mitigated	Less-than-Significant Impact
3.10 Noise. Would the proposed project result in:				
a. Increases in existing noise levels?				
Short-term	☒	☐	☐	☐
Long-term	☐	☐	☐	☒
b. Exposure of people to severe noise levels?				
Short-term	☒	☐	☐	☐
Long-term	☐	☐	☐	☒
c. Exposure of people to excessive groundborne vibration?	☒	☐	☐	☐

This discussion is based on the noise impact analysis presented in the *Noise Study Report for Access Improvements from Railyards to Richards Boulevard and Interstate 5* (NSR) (ICF Jones & Stokes 2008). The following is a brief discussion of terminology used in this discussion.

- **Sound:** A vibratory disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- **Noise:** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- **Decibel (dB):** A unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micropascals.
- **A-weighted decibel (dBA):** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- **Equivalent sound level (L_{eq}):** The average of sound energy occurring over a specified period. In effect, L_{eq} is the steady-state sound level that in a stated period would contain the same acoustical energy as the time-varying sound that actually occurs during the same period.
- **Day-night level (L_{dn}):** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring during the period from 10 p.m. to 7 a.m.
- **Peak particle velocity (PPV):** The maximum velocity of a particle in a vibrating medium such as soil. PPV is usually expressed in inches/second.

In general, human sound perception is such that a change in sound level of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving a sound level.

Environmental Setting

Developed land uses in the project area are all commercial uses that include motels, restaurants, and office buildings (Figure 3.10-1). Two of the motels have pool areas. The City's 2030 General Plan treats "residences" and "buildings where people normally sleep" as having similar noise sensitivity. For this reason motels in the project area are considered to be noise-sensitive land uses.

Noise in the project area is dominated by noise from traffic traveling on I-5. Short-term noise monitoring was conducted in the project area to characterize existing noise conditions. Refer to the NSR for details on the measurement process. Table 3.10-1 summarizes the noise measurement results. Refer to Figure 3.10-1 for the location of measurement positions.

Table 3.10-1. Summary of Short-Term Measurements

Position	Land Uses	Start Time	Duration (minutes)	Measured L_{eq}
R-10	Motel pool	9:40 a.m.	10	70.0
R-10	Motel pool	10:38 a.m.	10	68.7
R-6	Motel pool	10:04 p.m.	10	67.3
R-6	Motel pool	10:17 a.m.	5[a]	67.4

[a] Measurement was cut short because of landscaping noise.

Long-term noise monitoring was not specifically conducted for this project. However, as part of another project in the area, ICF Jones & Stokes conducted long-term monitoring at a location along I-5 about 1,200 feet north of El Camino Boulevard. This long-term measurement conducted on November 15, 2008, indicates that L_{dn} values along I-5 are about 3 dB greater than the worst-hours L_{eq} noise level. This information will be used to develop L_{dn} values from the calculated worst-hours noise level prepared for the project NSR.

Standards of Significance

For the purposes of this analysis, a significant impact would occur if:

- The project would result in exterior noise levels in the project area that are above the upper value of the normally acceptable category for various land uses due to the project's noise level increases (for the purposes of this analysis, this is defined as an exceedance of the exterior incremental noise impact standards indicated in Table 3.10-2).
- Construction noise levels would exceed the standards in the City's noise ordinance (Chapter 8.68 of the Sacramento City Code).

- Existing residential and commercial areas would be exposed to vibration PPVs greater than 0.5 inch per second as a result of project construction.
- Adjacent residential and commercial areas would be exposed to vibration PPVs greater than 0.5 inch per second as a result of highway traffic and rail operations.
- Historic buildings and archaeological sites would be exposed to vibration PPVs greater than 0.2 inch per second as a result of project construction or highway traffic.

Table 3.10-2. Exterior Incremental Noise Impact Standards for Noise Sensitive Uses

Residences and Buildings Where People Normally Sleep[a]	
Existing L_{dn}	Allowable Noise Increment
45	8
50	5
55	3
60	2
65	1
70	1
75	0
80	0

Source: City of Sacramento 2009.

[a] This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.

Answers to Checklist Questions

a. **Short-term:** Construction activities associated with the proposed project would result in short-term increases in noise. Table 3.10-3 summarizes typical noise levels from construction activity (Federal Transit Administration 2006).

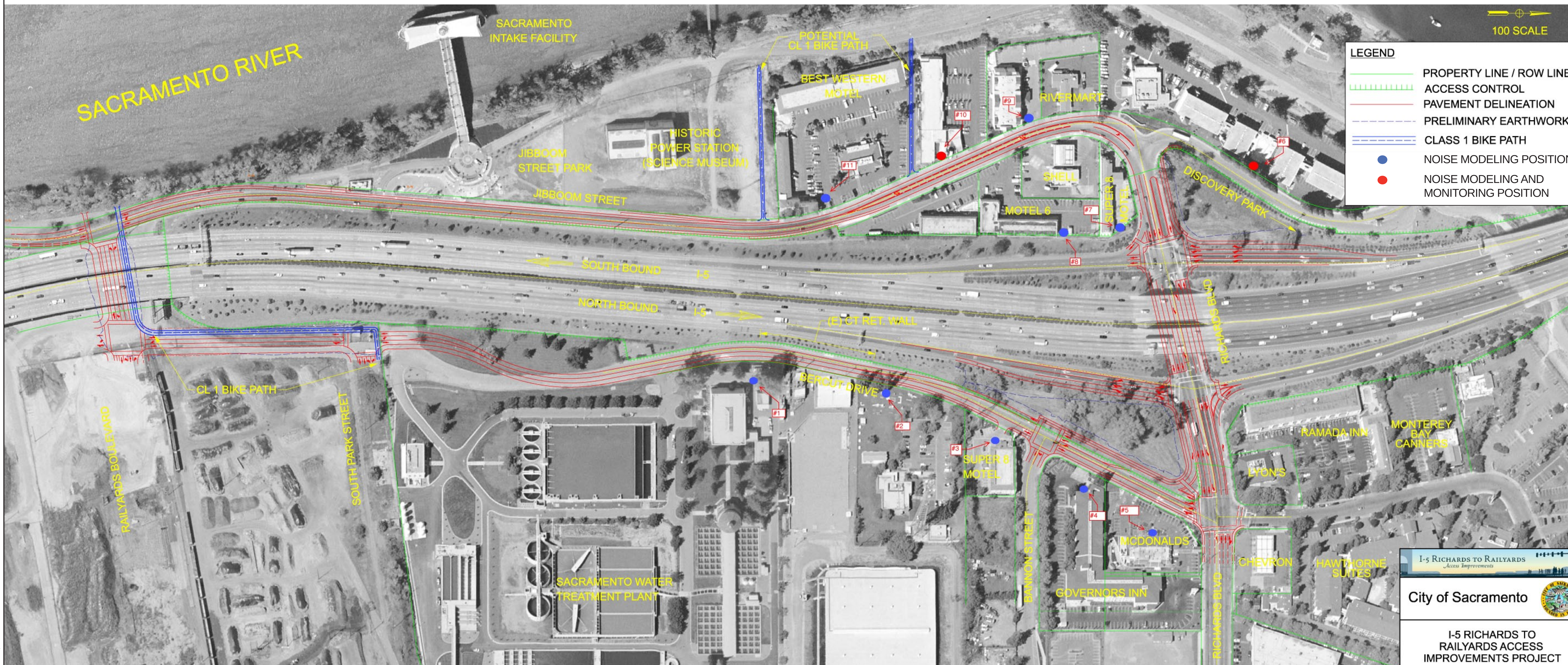


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Figure 3.10-1
Noise Modeling and Monitoring Positions

Table 3.10-3. Construction Equipment Noise

Type of Equipment	Typical Level (dBA at 50 feet)
Air compressor	81
Backhoe	80
Bulldozer	85
Compactor	82
Concrete pump	82
Grader	85
Impact wrench	85
Jackhammer	88
Loader	85
Pneumatic tool	85
Saw	76
Scraper	89
Truck	88

Source: Federal Transit Administration 2006.

Construction noise typically attenuates at a rate of 6 dB per doubling of distance. A reasonable worst-case assumption is that the three loudest pieces of equipment (jackhammer, scraper, and truck) would operate concurrently in the same location. The combined noise level of these three pieces of equipment would be 93 dBA at 50 feet.

The City's noise ordinance establishes these exterior noise standards for residential properties.

- From 7 a.m. to 10 p.m., the exterior noise standard is 55 dBA.
- From 10 p.m. to 7 a.m., the exterior noise standard is 50 dBA.

The standards are adjusted depending on the duration of noise generation within any given hour. For the purposes of this analysis, construction noise is assumed to operate continuously for at least 1 hour. The noise ordinance exempts construction noise between the hours of 7 a.m. and 6 p.m. on Monday, Tuesday, Wednesday, Thursday, Friday, and Saturday, and between 9 a.m. and 6 p.m. on Sunday, provided that the operation of an internal combustion engine will not be exempt if such engine is not equipped with suitable exhaust and intake silencers in good working order.

Assuming a source level of 93 dBA at 50 feet and attenuation at a rate of 6 dB per doubling of distance, the 55 dBA daytime standard could be exceeded within about 4,000 feet of construction, and the nighttime standard could be exceeded within about 7,000 feet. Local acoustical shielding from structures and topography and the high ambient noise level in the project area from traffic on I-5 will likely reduce these distances substantially. Nonetheless, this analysis indicates that construction activity during non-exempt hours has the potential to result in an exceedance of the noise ordinance standards at nearby noise-sensitive uses.

Sacramento 2030 General Plan Policy EC 3.1.10 requires all development projects subject to discretionary approval to assess potential construction noise impacts on nearby sensitive uses and to minimize impacts on these uses, to the extent feasible. Because this policy requires mitigation of construction noise from future development and because construction noise would be restricted in intensity and hours of operation by the City's noise ordinance, this impact would be less than significant.

Long-term: Table 3.10-4 summarizes traffic noise modeling results expressed in term of L_{dn} so that the results can be compared with City noise standards. L_{dn} values were determined from worst-hour L_{eq} values from the NSR by adding 3 dB. As discussed above, long-term monitoring indicates that this is the appropriate conversion factor.

Table 3.10-4. Traffic Noise Modeling Results

Receiver Location	Land Use	Existing Worst-Hour L_{dn} (dBA)	2021 Without-Project L_{dn}	2021 With-Project L_{dn}
R-1	Commercial	78	79	79
R-2	Commercial	78	79	79
R-3	Motel	76	77	77
R-4	Motel	74	75	75
R-5	Commercial	73	74	74
R-6	Motel (pool)	74	75	75
R-7	Motel	76	78	78
R-8	Motel	77	78	78
R-9	Commercial	73	74	74
R-10	Motel (pool)	75	76	76
R-11	Motel	76	78	78

Note: With-project noise levels are the same as no-project noise levels.

The results in Table 3.10-4 indicate that implementation of the proposed project would not increase traffic noise levels relative to no-project conditions. This impact would be less than significant.

b. **Short-term:** The short-term discussion for checklist question a. indicates that construction activity during non-exempt hours has the potential to result in an exceedance of the noise ordinance standards at nearby noise-sensitive uses. Because *Sacramento 2030 General Plan* Policy EC3.1.10 requires mitigation of construction noise from future development and because construction noise would be restricted in intensity and hours of operation by the City's noise ordinance, this impact would be less than significant.

Long-term: The results in Table 3.10-4 indicate that traffic noise in the project area currently exceeds and would continue to exceed City land use compatibility standards for transient lodging (65 L_{dn}) and office buildings (70 L_{dn}) with or without implementation of the proposed project. Because the proposed project is not predicted to increase traffic noise, this impact would be less than significant.

c. **Construction vibration:** Operation of heavy equipment may generate groundborne vibration that could be perceptible at sensitive land uses close to construction activity. Table 3.10-5 summarizes vibration levels at various distances based on source levels developed by the Federal Transit Administration (FTA) (Federal Transit Administration 2006).

Table 3.10-5. Vibration from Construction Equipment

Equipment	PPV at 25 feet	PPV at 50 feet	PPV at 100 feet	PPV at 150 feet	PPV at 250 feet
Vibratory Roller	0.210	0.074	0.026	0.014	0.007
Hoe Ram or Large Bulldozer	0.089	0.031	0.011	0.006	0.003
Loaded Truck	0.076	0.027	0.01	0.005	0.002
Jackhammer	0.035	0.012	0.004	0.002	0.001

Commercial uses would be located within about 100 feet of construction activity. The results in Table 3.10-5 indicate that construction activity has the potential to result in vibration at commercial uses that exceeds the PPV threshold for commercial uses of 0.5 inches/second. Implementation of *Sacramento 2030 General Plan* EC 3.1.5 would mitigate this impact to a less-than-significant level by limiting vibration to acceptable levels as defined by the City.

The Historic PG&E power station (future Science Museum) is the only historic structure near the project area. It is located about 150 feet from the nearest project-related construction activity. The PPV threshold for historic buildings is 0.2 inches/sec. Because vibration from construction activity is not predicted to exceed this value at the Historic Power Station (see Table 3.10-5) the vibration impact at the station would be less than significant.

Highway Traffic Vibration: In general, vibration generated by highway traffic is not perceptible at adjacent locations because vehicles ride on pneumatic tires with spring suspension. Loaded trucks typically produce the highest level of vibration: a PPV of 0.076 inches/second (Federal Transit Administration 2006), well below the 0.5 inches/second threshold for adjacent residential and commercial uses and the 0.25 threshold for historic buildings and archaeological sites. This impact would be less than significant.

Mitigation Measures

No mitigation measures beyond those identified in the MEIR are required.

Findings

All noise and vibration impacts associated with the proposed project would be less than significant or would be mitigated by MEIR policies or mitigation measures.

	Impact for Which the General Plan MEIR Mitigates to a Less-than-Significant Level	Potentially Significant Impact That Requires Analysis in an EIR	Potentially Significant Impact Unless Mitigated	Less-than-Significant Impact
3.11 Public Services. Would the proposed project have an effect upon or result in a need for new or altered government services in any of the following areas:				
a. Fire protection?	☐	☐	☐	☒
b. Police protection?	☐	☐	☐	☒
c. Schools?	☐	☐	☐	☒
d. Maintenance of public facilities, including roads?	☐	☐	☐	☒
e. Other governmental services?	☐	☐	☐	☒

Environmental Setting

The proposed project encompasses both sides of the I-5 corridor from the Sacramento Railyards north to Richards Boulevard. In addition to improvements to the I-5/Richards Boulevard interchange (including its approaches), the proposed project would widen and improve Jibboom Street and Bercut Drive, extend Bercut Drive south, and build a new I-5 undercrossing at Railyards Boulevard connecting Jibboom Street and Bercut Drive. Jibboom Street, Bercut Drive, and the future Railyards Boulevard are City streets.

Basic public services (i.e., fire protection, police protection, and road maintenance) are provided to the proposed project site and its surroundings by the City.

Standards of Significance

For the purposes of this analysis, a significant impact would occur if:

- The proposed project would require or result in the construction of new, or the expansion of existing, facilities related to the provision of fire protection, police protection, school facilities, roadway maintenance, or other governmental services.

Answers to Checklist Questions

a. The proposed project would involve road improvements. Road construction activities do not typically have a fire risk. The proposed project would not require fire protection service when in operation, and no new facilities are necessary in order to serve the proposed project. Upon completion, the proposed project would provide improved fire protection access to the area west of I-5 through the Railyards Boulevard tunnel and over the widened Richards Boulevard overcrossing. The impact of the proposed project on fire protection services would be less than significant.

b. The proposed project would create no demand for police services either during construction or when in operations. As a result, no new facilities are necessary in order to serve the proposed project. When completed, the proposed project would provide improved access to the area west of I-5 from the planned police and fire facility in the Railyards.

The impact of the proposed project on police services would be less than significant.

c. The proposed project would not include any residential component. As a result, it would not generate any additional needs for schools (no increase in schoolchildren) or necessitate the construction of new school facilities.

The impact of the proposed project on schools would be less than significant.

d. The proposed project would marginally increase the extent of City roadways to be maintained. The amount of new road surface to be maintained would not substantially contribute to the City's overall maintenance burden. Thus, the impact on roadway maintenance would be less than significant.

e. The proposed project would not alter the existing recreational areas that adjoin it, nor would it alter demand for park facilities. Thus the proposed project's impact would be less than significant.

Mitigation Measures

There would be no significant impacts related to public services, and therefore no mitigation measures would be required.

Findings

There would be no significant impacts related to public services.

	Impact for Which the General Plan MEIR Mitigates to a Less-than-Significant Level	Potentially Significant Impact That Requires Analysis in an EIR	Potentially Significant Impact Unless Mitigated	Less-than-Significant Impact
3.12 Utilities. Would the proposed project result in the need for new systems or supplies, or substantial alterations to the following utilities:				
a. Communication systems?	☐	☐	☐	☒
b. Local or regional water supplies?	☐	☐	☐	☒
c. Local or regional water treatment or distribution facilities?	☐	☐	☐	☒
d. Sewer or septic tanks?	☐	☐	☐	☒
e. Stormwater drainage?	☐	☐	☐	☒
f. Solid-waste disposal?	☐	☐	☐	☒

Environmental Setting

Utilities within project limits include the Sacramento Municipal Utility District (SMUD), PG&E, City storm drainage, water and sewer, and Kinder Morgan petroleum (David Evans and Associates 2009a). Telecommunication service in Sacramento is provided by AT&T (SBC), Sprint, Comcast, and Electric Lightwave Inc (PBS&J 2008).

According to the preliminary drainage study, the project watershed encompasses approximately 64 acres and consists primarily of developed land. It does not include the Railyards. Approximately 63.2 acres of the watershed surrounding the project drains to two Caltrans retention basins, and the other 0.8 acre drains to the Sacramento CSS (David Evans and Associates 2009b).

Runoff in the project watershed generally drains from south to north. The existing depressed open spaces adjacent to the southeast and northwest quadrants of the I-5/Richards Boulevard interchange function as retention basins owned and operated by the State of California (retention basins No. 1 and No. 2, respectively). The City is responsible for the maintenance and operation of the storm drain system outside Caltrans' right-of-way, including facilities along Jibboom Street, Bercut Drive, and Richards Boulevard east of Bercut Drive (David Evans and Associates 2009b).

Surface runoff along Interstate 5 either flows in the median (along a concrete barrier) or along an asphalt dike at the edge of pavement. Surface runoff in the median is collected in drainage inlets and piped across the I-5 travel lanes to a lined channel along the I-5 toe of fill. Similarly, surface runoff along the edge of pavement is collected in down drains and discharged to a lined channel along the toe of fill (David Evans and Associates 2009b).

Surface runoff along portions of Jibboom Street is collected in the gutter and directed to a storm drain system. However, curb and gutter does not exist adjacent to the historic PG&E power station property, where surface flow is conveyed in a poorly defined roadside ditch. The ditch grade is flat, and surface water appears to pond in a localized low spot in front of the property directly adjacent to Jibboom Street. This low spot appears to store runoff until it eventually spills over into a roadside drainage inlet farther downstream (David Evans and Associates 2009b).

Surface runoff along Bercut Drive is mostly collected in the curb and gutter and flows to a storm drain system. At the southern limits of Bercut Drive adjacent to the water treatment plant, curb and gutter do not exist, and surface flow is conveyed along the edge of pavement until it reaches curb and gutter adjacent to a Caltrans irrigation pump house. The storm drain system in front of the water treatment facility office building is piped across Bercut Drive into a retention basin. The storm drain inlets between Bannon Street and Richards Boulevard are collected in a system that travels east and away from the project (David Evans and Associates 2009b).

Surface runoff along Richards Boulevard between Jibboom Street and Bercut Drive is collected in a concrete gutter and is directed via storm drains to retention basin No. 1. Retention basin No. 1 drains to retention basin No. 2, from which it is ultimately pumped into the American River. Surface runoff to the east of Bercut Drive is collected and conveyed away from the project (David Evans and Associates 2009b).

In addition to retention basins No. 1 and No. 2, drainage facilities within the project limits include two lined channels. The channels parallel the east and west sides of I-5 along the toe of fill. The eastern channel runs north from the West End Viaduct and terminates adjacent to a Caltrans irrigation pump house on Bercut Drive. The channel then continues north in a 30-inch pipe that discharges directly into retention basin No. 1. Drainage from retention basin No. 1 is conveyed in a pipe under I-5 to retention basin No. 2. The western channel begins near the historic PG&E power station and continues north to a terminus at Richards Boulevard. Flow is then conveyed under Richards Boulevard in a 30-inch pipe to retention basin No. 2 (David Evans and Associates 2009b).

The project proposes to widen the facility into the retention basins, thereby reducing the available storage capacity. In response, the project would lower the bottom of retention basin No. 1 by approximately 9 inches in order to avoid a net decrease in its storage capacity (David Evans and Associates 2009a).

As noted in Section 2, construction of new water, sanitary sewer, and storm drainage lines are proposed as part of the project. Additionally, the proposed project would generate solid waste during construction. Typical construction waste includes broken pavement, concrete, wood, paper, plastic, and metal. There are no available estimates of the volume of solid waste that is anticipated to be produced during construction of the project. In regard to waste collection, the MEIR for the *Sacramento 2030 General Plan* (PBS&J 2008:6.11-66) states:

> Construction and demolition waste and commercial waste that is collected by both the City's fleet as well as private companies is disposed at a variety of facilities, including the Sacramento County Kiefer Landfill, the Yolo County Landfill, Forward Landfill, and L and D Landfill. Private haulers can deliver waste to the landfill of their choice and base the decision on market conditions and capacity.

Standards of Significance

For the purposes of this analysis, a significant impact would occur if the proposed project:

- Would result in a detriment to microwave, radar, or radio transmissions.
- Would create an increase in water demand of more than 10 million gallons per day.
- Would substantially degrade water quality.
- Would result in the determination of the wastewater treatment provider that adequate capacity is not available to serve the project's demand in addition to existing commitments.
- Would generate stormwater that would exceed the capacity of the stormwater system.
- Would require or result in either the construction of new utilities or the expansion of existing utilities, the construction of which could cause significant environmental effects.

Answers to Checklist Questions

a. Construction of the proposed project would potentially disrupt existing communications transmission lines and temporarily disrupt telecommunication systems. However, standard construction practice includes contacting all utilities and Underground Service Alert (USA) prior to work. This practice ensures that any aboveground or underground lines would be identified and that their locations would be mapped prior to construction. To ensure that disruptions of utility services are minimized or avoided, the City would work with utility providers with infrastructure in the area, on utility relocation within the project area. Based on utility provider information, specific measures to avoid impacts on utility infrastructure would be developed and incorporated into the final construction plans.

Therefore, the proposed improvements would have a less-than-significant impact on the need for new systems or supplies or for substantial alterations to communication systems.

b., c. The proposed project would replace the existing twin 30-inch water transmission mains, with a new 12-inch water distribution (service) main and a new 42-inch water transmission main beneath the proposed southern extension of Bercut Drive. The northern portion of this line would connect to currently active lines on Bercut Drive, but would remain unused until a future project needed service. Additionally, a new 12-inch water line would be inserted under the portion of Railyards Boulevard running from Jibboom Street to Bercut Drive and a utility connection for a future 12-inch water line would be inserted under the intersection of Railyards Boulevard and Bercut Drive. These water lines would remain dry until downstream water lines would be built with the future planned RSP development. This proposed infrastructure within the RSP boundaries would facilitate development of the Railyards. The potential impacts of the Railyards development on water supply and water treatment facilities were analyzed in the RSP EIR, which, in turn, found that development within the RSP would not exceed water supplies in Sacramento and that, with the implementation of Mitigation Measure 6.11-8 of that EIR, it would not exceed wastewater treatment plant capacity (PBS&J/EIP 2007). Therefore, this impact would be less than significant.

Additionally, as part of the proposed project, an irrigation system would be installed to serve the new landscaping/planters located on Railyards Boulevard, Bercut Drive, and the northern portion of Jibboom Street. This irrigation system would use water from the City's existing supply. A 12- inch water line would also be placed under Jibboom Street for future use. It would eventually replace the existing water line located on the PG&E property, which currently serves the Robert T. Matsui Waterfront Park. This line would connect to currently active lines on Jibboom Street, but would remain unused until a future project needed service. The proposed project would not alter the existing water line located on the PG&E property, which would continue to serve the Robert T. Matsui Waterfront Park. The relocated water line would accommodate the development of the science museum. Per the City's General Plan MEIR, the City, under its existing water right permits and U.S. Bureau of Reclamation contract, would be able to meet the total retail and wholesale water demand projected for buildout of the *Sacramento 2030 General Plan* (PBS&J 2008).

Therefore, the proposed project's impact on local or regional water supplies and water treatment facilities is within the scope of the General Plan MEIR and is less than significant.

d. Within the RSP area, a new 8-inch sanitary sewer line would be constructed under the Bercut Drive extension and a utility connection for a future 33-inch sanitary sewer line would be constructed at the intersection of Railyards Boulevard and Bercut Drive as part of the proposed project. These sanitary sewer lines would remain dry until downstream sanitary sewer lines would be built with the future planned RSP development. This proposed infrastructure extension would facilitate development of the Railyards. The potential environmental impact associated from this sanitary sewer system extension was already analyzed under the RSP EIR, which found that, with the implementation of the Mitigation Measures 6.11-1 and 6.11-2 found within the RSP EIR, the RSP EIR would be able to limit wastewater and stormwater flows "to a level that would not exceed the City's contract for flows to the [Sacramento River Water Treatment Plant]" prior to construction of the Railyards development (PBS&J/EIP 2007). With regard to cumulative impacts on sewer capacity, the RSP EIR found that "[b]ecause implementation of the existing programs are expected to ensure that capacity is available as growth occurs, cumulative impacts to the SRWTP facilities would be less than significant." (PBS&J/EIP 2007).

Additionally, a 4-inch sanitary sewer line would be placed under Jibboom Street for future use. It would eventually replace the existing sanitary sewer line located on the PG&E property, which currently serves the Robert T. Matsui Waterfront Park. This line would connect to currently active lines on Jibboom Street, but would remain unused until a future project needed service. The proposed project would not alter the existing sanitary sewer line located on the PG&E property, which would continue to serve the Robert T. Matsui Waterfront Park. The relocated sanitary sewer line would accommodate the development of the science museum. The City's General Plan MEIR found that "there would be sufficient capacity to accommodate increases in wastewater, in addition to providers' existing commitments, and there are established plans and programs in place as well as policies to increase capacity in response to demand" for buildout of the *Sacramento 2030 General Plan* (PBS&J 2008). As such, the impact to sewer systems as a result of the proposed project would be less than significant.

e. As noted in Section 3.4, "Water," of this document, the proposed project would change the amount of stormwater runoff from the project area. The preliminary drainage study for the project (David Evans and Associates 2009b) evaluated and recommended possible upgrades to convey the additional amount of runoff from the project area. The most cost-effective solution was to retain the capacity of retention basin No. 1 by lowering the bottom of the basin by approximately 9 inches. Doing so would create a net storage capacity gain of approximately 49,000 cubic feet. Implementation of this recommendation would be expected to safely store the increased amount of runoff from the proposed project.

In addition, the proposed project would use the following common storm drain design practices and new design features:

- The off-ramps' drainage patterns would be perpetuated by replacing the existing overside drains and extending the culverts.
- Richards Boulevard would remain unchanged where no widening would occur. The widened sections would include curb and gutter, with extensions of the existing underground storm drain systems supplemented by new inlets and drains to accommodate the added flows from widened pavement.
- Jibboom Street would remain relatively unchanged as the majority of existing curb and gutter would remain. A new 18-inch storm drainage line would be added and would tie into an existing open channel beginning just south of road stationing 26+00, which in turn would drain into the retention basin located adjacent to the southbound I-5 off ramp.

  Railyards Boulevard would have newly added roadway and would include curb and gutter with new storm drain laterals to a central line in the street.

Runoff would be piped to exit the site in its current flow pattern. A new 18-inch storm drainage line would be inserted under the portion of Railyards Boulevard running from Jibboom Street to Bercut Drive. Additionally, at the intersection of Railyards Boulevard and Bercut Drive, a utility connection for a 72-inch storm drainage line would be constructed. These lines would remain dry until downstream storm drainage lines would be built with the future planned RSP development.

- The storm drainage system along Bercut Drive would include new curb and gutter along the widened and added sections. Runoff along Bercut Drive currently flows from the Railyards property line north and discharges into the existing retention basin adjacent to the northbound I-5 off ramp. This flow pattern is to remain unchanged. A new 15-inch storm drainage line would be constructed under Bercut Drive just north of road stationing 21+00. This line would tie into another proposed 18-inch storm drainage line. Runoff from these lines would drain into an existing, open channel that currently discharges into the retention basin located adjacent to the northbound I-5 off ramp. A 12-inch storm drainage line would also be inserted under Bercut Drive, just south of road stationing 28+00. This line would directly outfall into the existing retention basin located adjacent to the northbound I-5 off ramp.

  Runoff along Bercut Drive, south of the Railyards property line, flows south to drainage and sewer pipelines. A new 18-inch storm drainage line would be inserted under the portion of Bercut Drive running from South Park Street south to Railyards Boulevard. This line would remain dry until downstream storm drainage lines would be built with the future planned RSP development. After the Railyards property develops, this runoff would eventually flow into the proposed Railyards cistern located just south of the Railyards/Bercut intersection.

According to the preliminary drainage study (David Evans and Associates 2009b), the City of Sacramento Combined Sewer System (CSS) would not experience increases in stormwater runoff after completion of the proposed project. Pre- and post-construction estimates have the Bannon Street storm drain, the only CSS drain inlet, receiving runoff from 0.77 acres (David Evans and Associates 2009b). The proposed project would not increase the impervious surfaces for the Bannon Street storm drain inlet. Therefore, construction of the proposed project would not require improvements to the City's drainage facilities. Furthermore, the City's General Plan MEIR found that development assumed to occur under the Sacramento 2030 General Plan would not produce any increase in the cumulative stormwater runoff and as a result would not require any new regional facilities. Thus, the proposed project's impact on stormwater systems would be less than significant.

f. The proposed project would generate construction waste, and a corresponding demand on solid waste disposal. However, *Sacramento 2030 General Plan* Policy U 5.1.12 would help reduce this impact by requiring the reuse of construction wastes. Policy U 5.1.12 states:

> The City shall require recycling and reuse of construction wastes, including recycling materials generated by the demolition and remodeling of buildings, with the objective of diverting eighty-five percent to a certified recycling processor.

Additionally, the General Plan MEIR found that the implementation of the General Plan policies related to solid waste disposal, along with the remaining capacity and expected lifespan at the Lockwood and Kiefer Landfills, combined with the continued use of the existing and future transfer stations, the City would have sufficient solid waste capacity to serve the increased development associated with the *Sacramento 2030 General Plan* and that the impact of buildout would be less than significant (PBS&J 2008).

The proposed project is consistent with the *Sacramento 2030 General Plan*. Thus, this potential impact is within the scope of the General Plan MEIR and is less than significant.

Mitigation Measures

There would be no significant impacts related to public utilities. No mitigation measures would be required.

Findings

There would be no significant impacts related to public utilities.

	Impact for Which the General Plan MEIR Mitigates to a Less-than-Significant Level	Potentially Significant Impact That Requires Analysis in an EIR	Potentially Significant Impact Unless Mitigated	Less-than-Significant Impact
3.13 Aesthetics, Light, and Glare. Would the proposed project:				
a. Affect a scenic vista or adopted view corridor?	☐	☐	☐	☒
b. Have a demonstrable negative aesthetic effect?	☐	☐	☐	☒
c. Create light or glare?	☐	☐	☒	☐

Environmental Setting

The proposed project area is located in the city of Sacramento, east of the Sacramento River, south of the American River, north of the RSP area and west of the Richards Boulevard commercial corridor. The area, though bounded by the Sacramento and American Rivers to the west and north, is primarily a commercial corridor, with industrial uses intermixed with lodging, gas, and restaurant facilities. Robert T. Matsui Waterfront Park and Discovery Park, two riverside recreation areas, as well as a planned science museum at a historic PG&E power station, may bring day-use visitors.

Existing views from the project area include the linear I-5 structure, including the elevated portions at the south and north where the freeway adjoins Old Sacramento and passes over Richards Boulevard, respectively; the open Railyards property with its few remaining Southern Pacific shop buildings to the east of the project area; highway-serving commercial uses at the Richards Boulevard interchange along the northern portion of the project area; the Sacramento River to the east; and the downtown Sacramento skyline to the southeast.

The existing I-5/Richards Boulevard interchange includes an elevated I-5 overcrossing located in an urban setting, with nearby hotels of two stories in height creating a backdrop for the interchange. The existing visual impacts of Jibboom Street and Bercut Road are minimal. They are at-grade, two-lane streets that do not stand out visually from their surroundings.

The City has adopted design-review districts covering the Richards Boulevard Special Planning District (SPD) and the Sacramento Railyards SPD. These districts apply the City's design-review code (Sacramento City Code Chapter 17.132) to development applications. The applications are reviewed by the City design director to ensure that:

- The desirability of adjacent and surrounding properties is enhanced.
- The benefits of occupancy of adjacent and surrounding properties are improved.
- The value of surrounding properties is increased.
- Appropriate development of adjacent and surrounding properties is encouraged.
- The maintenance and improvement of surrounding properties is encouraged, resulting in the enhancement of the health, safety, aesthetics, and general welfare of the inhabitants of the area and the inhabitants of the City at large.

The design-review code, the Richards Boulevard SPD, and the Sacramento Railyards SPD (Sacramento City Code Chapters 17.132, 17.120, and 17.124, respectively) provide a protocol for the application of design review and specific standards for residential, commercial, and industrial development. However, these regulations are not directly applicable to public road projects.

The *Sacramento 2030 General Plan* has the following pertinent policies for visual resource preservation.

> **ER 7.1.2 Landscaping.** The City shall require new development be located and designed to visually complement the natural environment/setting when near the Sacramento and American rivers, and along streams.
>
> **ER 7.1.5 Lighting.** The City shall minimize obtrusive light by limiting outdoor lighting that is misdirected, excessive, or unnecessary.
>
> **ER 7.1.6 Glare.** The City shall require that new development avoid the creation of incompatible glare through development design features.

Standards of Significance

For the purposes of this analysis, a significant impact would occur if:

- The project would cast glare in such a way as to cause public hazard or annoyance for a sustained period of time.
- The project would cast light onto oncoming traffic or residential uses.

Answers to Checklist Questions

a. There are no designated scenic vistas or adopted view corridors in the project area. This impact would be less than significant.

b. The proposed project would, with two exceptions, rebuild existing interchange and road facilities, resulting in minimal changes to the existing visual impacts of these facilities. It also would extend Bercut Drive to the south and construct a new Railyards Boulevard connection between Bercut Drive and Jibboom Street. These extensions would not obstruct any existing views and would have little impact on area aesthetics or visual resources. As a result, the proposed project would not conflict with *Sacramento 2030 General Plan* policy ER 7.1.1, "Protect and Enhance Scenic Views."

The I-5 freeway is elevated above ground level within the project area and establishes a barrier to views west from Bercut Road and east from Jibboom Street. The proposed project would widen the existing I-5/Richards Boulevard interchange off-ramps. The interchange on-ramps would be modified only at their intersections with Richards Boulevard to accommodate the Richards Boulevard widening. Ramp meters would be added to the northbound on-ramp. Richards Boulevard would be widened between Jibboom Street and Bercut Drive to provide added vehicle-lane capacity, and tie-back walls of up to 11 feet in height would be installed at the bridge abutments. Six-foot to 8-foot bike lanes would be added to Richards Boulevard, except between the northbound ramps and Bercut Drive, where there would be no roadside shoulders. A 4-foot bike lane would be added between the outside through and right-turn lane. Wider sidewalks would be added within the widened sections of Richards Boulevard. The existing signal-controlled intersections would be modified at both ramp intersections with Richards Boulevard, as well as the Richards Boulevard/Bercut Drive intersection.

The proposed Jibboom Street improvements would consist of 11-foot to 12-foot vehicle and 5-foot to 6-foot bike lanes. The northern segment of Jibboom Street is constrained by existing businesses. Existing sidewalks, landscaping, and frontages would remain. A 12-foot-wide two-way left-turn lane would be added to improve vehicle access to businesses.

The southern segment of Jibboom Street is constrained by I-5 along the east side and several environmentally sensitive properties along the west side, namely the levee/river, Robert T. Matsui Waterfront Park, and the historic PG&E power station (currently planned for redevelopment into a science museum). Existing sidewalks and landscaping would be used in the area adjacent to Robert T. Matsui Waterfront Park. The proposed project may construct the science museum frontage (sidewalk and bike lane), which would fill the existing sidewalk gap on Jibboom Street. If the project lacked available right-of-way to complete the science museum frontage, temporary asphalt sidewalks would be constructed and then replaced with permanent sidewalks when the science museum had been constructed.

The existing Bercut Drive is constrained by I-5 along the west side and the Sacramento Water Treatment Plant on the east between South Park and Bannon Streets and would have 11-foot lanes and 5-foot bike lanes. An 11.5-foot sidewalk with landscaping would be installed on the east side from South Park Street to road stationing 25+00. A 9-foot sidewalk would be used in the narrow segment from road stationing 25+00 to 35+00.

The southern segment of Bercut Drive between Railyards Boulevard and South Park Street would have 11-foot lanes, no shoulders or bike lanes, a 14.5-foot sidewalk with landscaping on the east side, and a Class I bicycle trail on the west side. A new signal-controlled intersection with left-turn lanes would be added at the Bercut Drive/South Park Street intersection.

A short segment of Railyards Boulevard would be constructed as part of the proposed project. This new roadway would connect Bercut Drive to Jibboom Street with a crossing beneath I-5, using four 11-foot lanes, 6-foot bike lanes, and 16.5-foot sidewalks. The existing I-5 structure is elevated in this location, and no change in elevation would result from the proposed project. The Class I bicycle trail beginning at the South Park Street/Bercut Drive intersection would be continued on the north side and connect to the Sacramento River Class I trail to the west at the Jibboom Street/Railyards Boulevard intersection. New signal-controlled intersections with left-turn lanes would be added at the Railyards Boulevard/Jibboom Street and Railyards Boulevard/Bercut Drive intersections.

The proposed project would not substantially increase the visibility or the profile/elevation of the existing facilities. Therefore, there would be no demonstrable negative aesthetic effect as a result of the project. Policies ER 7.1.2 and 7.1.3 of the *Sacramento 2030 General Plan* outline the requirements to use landscaping to visually complement the natural environment and setting, as well as minimize the removal of existing resources. New landscaping along the project area would minimize impacts created by the project. Planters with street trees would be constructed along Bercut Drive’s east side, as well as both sides of the future Railyards Boulevard, reducing the already minimal visual profile of these roads and improving their aesthetics. Existing landscaping would be enhanced and accentuated, and areas damaged by construction would be replaced and maintained. This impact would be less than significant.

c. Existing street lighting would remain or be perpetuated by relocation in widened sections. Street lighting exists on Richards Boulevard, on Bercut Drive between Richards Boulevard and Bannon Street, on Jibboom Street between Richards Boulevard and the planned science museum, and on Jibboom Street in the Robert T. Matsui Waterfront Park landscaping buffer behind the sidewalk. Lighting may be added along Bercut Drive between Richards Boulevard and Bannon Street, and in the lighting gaps on Jibboom Street. Added lighting will comply with the *Richards Boulevard Redevelopment Plan Amendment/Railyards Redevelopment Plan Draft Environmental Impact Report* (The Ervin Consulting Group 2008) design guidelines, which include those listed below. Adherence to these guidelines would reduce light and glare impacts in the area.

- The height of pole-mounted light fixtures in active pedestrian zones should not exceed 12–15 feet from grade to light source. On larger streets, at major intersections, a mounting height of up to 18 feet may be acceptable.
- Illumination generally should be focused at the ground, avoiding all unnecessary lighting of the night sky. Light fixtures should include internal reflector caps, refractors, or shields that provide an efficient and focused distribution of light, to avoid glare or reflection into the upper stories of adjacent buildings.

- Levels of illumination should correlate to the type and level of activity anticipated, without over-illuminating the area. The level of illumination for pedestrian areas should range from 0.5-foot candles in lower-activity areas to 2.0-foot candles in more critical areas. A foot candle is a unit of illumination, measured at a distance of 1 foot from the source of light.

Construction of the proposed project would occur during nighttime hours and would require the use of temporary lights. Lights used during nighttime construction would be shielded and focused by hoods and other implements in order to minimize the spill of light and glare outside the work area, as described in Mitigation Measure 3.13-1. Implementation of Mitigation Measure 3.13-1 would reduce this impact to less-than-significant levels.

Mitigation Measures

Mitigation Measure 3.13-1: Eliminate Excessive Nighttime Light and Glare

Lighting used during nighttime construction should implement light fixture shielding systems to emit light down to areas intended to be illuminated, and not into surrounding areas, thereby eliminating excessive nighttime light and glare that may affect nearby traffic and residents.

Findings

This project would have a less-than-significant impact on aesthetics and light, and, with mitigation, a less-than-significant impact on glare. Landscaping added as part of the project would provide enhanced views to areas along the project area as it matures, leading to a positive effect on the visual sphere of the area.

	Impact for Which the General Plan MEIR Mitigates to a Less-than-Significant Level	Potentially Significant Impact That Requires Analysis in an EIR	Potentially Significant Impact Unless Mitigated	Less-than-Significant Impact
3.14 Cultural Resources. Would the proposed project:				
a. Disturb paleontological resources?	☐	☐	☒	☐
b. Disturb archaeological resources?	☐	☐	☒	☐
c. Affect historical resources?	☐	☐	☐	☒
d. Have the potential to cause a physical change that would affect unique ethnic cultural values?	☐	☐	☒	☐
e. Restrict existing religious or sacred uses within the potential impact area?	☐	☐	☐	☒

Environmental Setting

Approximately 85% of the area of potential effect (APE) is developed and covered by buildings, asphalt, or gravel. The remaining 15% is either bare dirt or covered by annual grasses and other vegetation.

According to Figure 6.4-1 of the *Sacramento 2030 General Plan*, the proposed project area is adjacent to the Sacramento River and within an area of high sensitivity for archeological resources. Although the chance of discovering artifacts on the site is reduced because of previous site disturbance, resources could still exist that may be obscured by siltation or other activities.

The historic PG&E Power Plant is located approximately 100–150 feet west of the APE along Jibboom Street and has been recommended as eligible for listing in the National Register of Historic Places (NRHP) and the California Register of Historical Resources (CRHR). The proposed project, however, will have no impact on this resource.

There are no historic structures on or adjacent to the site (City of Sacramento 2009). Sacramento is not highly sensitive for paleontological resources (City of Sacramento 2009). No known religious or sacred uses occur within the project area.

Standards of Significance

For the purposes of this analysis, a significant impact would occur if:

- The project would cause a substantial change in the significance of a historical or unique archaeological resource as defined in State CEQA Guidelines Section 15064.5.
- The project would directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

Answers to Checklist Questions

Archaeological and historical investigations were conducted for the proposed project site and included a records search at the North Central Information Center at California State University, Sacramento, a literature review, historic map research, a sacred lands search completed by the Native American Heritage Commission in August 2008, Native American consultation conducted in August 2008, and a pedestrian surface survey of the project site conducted in August 2008 (ICF Jones & Stokes 2009). These investigations were conducted to comply with Section 106 of the National Historic Preservation Act of 1966 and its implementing regulations, as amended, and California Environmental Quality Act (CEQA) (Public Resources Code [PRC] 21000 et seq.), as amended.

As a result of these investigations, two previously recorded cultural resources were identified: the East Levee—Sacramento River, and the Richards Boulevard Underpass. Major modification to the East Levee since it was built in 1948 has compromised the integrity of the resource. It was determined not to be eligible for the NRHP (California Department of Parks and Recreation Office of Historic Preservation 2008) and not eligible for consideration to be listed in the CRHR.

The Caltrans local agency and statewide historic bridge inventory identified the Richards Boulevard Underpass Bridge No. 24-0250. This underpass, built in 1968, was determined not to be eligible for the NRHP.

Five previously unrecorded cultural resources (concrete foundation of the Frog and Switch Shop, three railroad segments, and a metal refuse scatter) were identified in the Railyards property within the project boundaries. The concrete pad is the only evidence of the Frog and Switch Shop that remains.

The Frog and Switch Shop concrete foundation and the railroad segments were recorded and evaluated as not eligible for consideration to be listed in the CRHR or the NRHP (ICF Jones & Stokes 2009a). The State Historic Preservation Officer of the Office of Historic Preservation concurred with this finding on June 17, 2009 (ICF Jones & Stokes 2009b). Finally, the East Levee—Sacramento River was evaluated as not eligible for consideration to be listed in the CRHR.

The NAHC responded with a list of Native American groups/individuals to contact regarding the project area. Letter and subsequent telephone calls were made to all listed by the NAHC. To date, no response has been received. Therefore, archaeological and historical investigations identified no significant cultural resources as defined in State CEQA Guidelines Section 15064.05 within the boundaries for the proposed project.

a. Sacramento is not considered highly sensitive for paleontological resources, and there are no known paleontological resources within the project area. However, there is the possibility of unanticipated and accidental paleontological discoveries during ground-disturbing project-related activities. Unanticipated and accidental paleontological discoveries during project implementation have the potential to affect significant paleontological resources. This would be considered a significant impact. The implementation of Mitigation Measure 3.14-1 would reduce the potential impact to a less-than-significant level by ensuring that work within the area would be stopped and that an appropriate course of action be undertaken to recover or preserve the find.

b. One non-significant archaeological resource exists within the project area, and site disturbance from road and highway construction, commercial development, and the installation of subsurface utilities renders the likelihood of discoveries to be low. Regardless, project-related ground-disturbing activities could directly destroy a resource or cause a substantial change in the significance of an archaeological resource. The implementation of Mitigation Measures 3.14-2, 3.14-3, and 3.14-4 would reduce the potential impact to a less-than-significant level by ensuring that work within the area would be stopped and that an appropriate course of action would be undertaken to recover or preserve the find.

c. Archaeological and historical investigations conducted for the project did not identify historical resources as defined in State CEQA Guidelines Section 15064.05. The proposed project’s impact on potential historic resources would be less than significant.

d. No known unique ethnic or cultural resources exist within the project site. However, the implementation of Mitigation Measures 3.14-2, 3.14-3, and 3.14-4 would reduce the potential impact to a less-than-significant level by ensuring that work within the area would be stopped and that an appropriate course of action would be undertaken to recover or preserve a find.

e. There are no known religious or sacred uses of the proposed project site. Therefore, there would be no impact on potential uses of such resources.

Mitigation Measures

Mitigation Measure 3.14-1: Consult with a Qualified Paleontologist

In the event that any paleontological features or deposits are discovered during construction-related earth-moving activities, all work within 100 feet of the resource will be halted, and the City will consult with a qualified paleontologist to assess the significance of the find. Paleontological test excavations will be conducted by a qualified paleontologist to aid in determining the nature and integrity of the find. If the find is determined to be significant by the qualified paleontologist, representatives of the City and the qualified paleontologist will coordinate to determine the appropriate course of action. All significant paleontological resources recovered will be subject to scientific analysis and professional museum curation. In addition, a report will be prepared by the qualified paleontologist according to current professional standards.

Mitigation Measure 3.14-2: Consult with a Qualified Archaeologist

In the event that any historic subsurface features, artifacts, or deposits and/or prehistoric subsurface archaeological features or deposits, including locally darkened soil ("midden"), that could conceal cultural deposits, animal bone, obsidian, or mortars are discovered during construction-related earth-moving activities, all work within 100 feet of the resource will be halted, and the City will consult with a qualified archaeologist to assess the significance of the find. Archaeological test excavations will be conducted by a qualified archaeologist to aid in determining the nature and integrity of the find. If the find is determined to be significant by the qualified archaeologist, representatives of the City and the qualified archaeologist will coordinate to determine the appropriate course of action. All significant cultural materials recovered will be subject to scientific analysis and professional museum curation. In addition, a report will be prepared by the qualified archaeologist according to current professional standards.

Mitigation Measure 3.14-3: Consult with an Archaeologist and Native American Representatives

If a Native American site is discovered, the evaluation process will include consultation with the appropriate Native American representatives. If Native American archaeological, ethnographic, or spiritual resources are involved, all identification and treatment will be conducted by qualified archaeologists who are certified by the Society of Professional Archaeologists (SOPA) or meet the federal standards as stated in the CFR (36 CFR 61), or both, and Native American representatives who are approved by the local Native American community as scholars of the cultural traditions.

In the event that no such Native American is available, persons who represent tribal governments or organizations in the locale in which resources could be affected will be consulted. If historic archaeological sites are involved, all identified treatment is to be carried out by qualified historical archaeologists, who will meet either Register of Professional Archaeologists (RPA) or 36 CFR 61 requirements.

Mitigation Measure 3.14-4: Stop Work and Consult with the County Coroner or NAHC, or Both

If a human bone or bone of unknown origin is found during construction, all work will stop within 100 feet of the find, and the county coroner will be contacted immediately. If the remains are determined to be Native American, the coroner will notify the Native American Heritage Commission, which will notify the person most likely believed to be a descendant. The most likely descendant will work with the contractor to develop a program for re-interment of the human remains and any associated artifacts. No additional work is to take place within the immediate vicinity of the find until the identified appropriate actions have taken place.

Findings

The project could inadvertently uncover paleontological resources as a result of ground-disturbing construction activities. Implementation of Mitigation Measure 3.14-1 would reduce the impacts on paleontological resources to a less-than-significant level.

The project could inadvertently uncover archaeological resources as a result of ground-disturbing construction activities. Implementation of Mitigation Measures 3.14-2 and 3.14-3 would reduce the impacts on archaeological resources to a less-than-significant level.

The project could inadvertently uncover previously unidentified human remains as a result of ground-disturbing construction activities. Implementation of Mitigation Measure 3.14-4 would reduce this impact to a less-than-significant level.

	Impact for Which the General Plan MEIR Mitigates to a Less-than-Significant Level	Potentially Significant Impact That Requires Analysis in an EIR	Potentially Significant Impact Unless Mitigated	Less-than-Significant Impact
3.15 Recreation. Would the proposed project:				
a. Increase the demand for neighborhood or regional parks or other recreational facilities?	☐	☐	☐	☒
b. Affect existing recreational opportunities?	☐	☐	☐	☒

Environmental Setting

The Robert T. Matsui Waterfront Park (formerly the Jibboom Street Park) is located to the east of the Sacramento River and abuts Jibboom Street. Being developed in phases, with the first phase complete, the Robert T. Matsui Waterfront Park surrounds the historic PG&E power station and extends to the recently completed Sacramento River Water Intake Facility to the south.

Portions of the Sacramento River Parkway are located on the western side of Jibboom Street. This parkway contains portions of the Sacramento River Parkway bicycle path that connects Old Sacramento to the Jedediah Smith Memorial Trail, which runs along the north bank of the American River (Herrera pers. comm.). The Robert T. Matsui Waterfront Park provides access to the Sacramento River Parkway bicycle path.

Surrounded by the Sacramento River to the west and the American River to the north, the northwest portion of the project area currently provides access to Tiscornia Park. Spanning approximately 10 acres, the park provides access to the American River and the Sacramento River Parkway bicycle path discussed above (City of Sacramento Department of Parks and Recreation 2009b).

Standards of Significance

For the purposes of this analysis, a significant impact would occur if:

- The proposed project would cause or accelerate a substantial physical deterioration of existing area parks or recreational facilities.
- The proposed project would create a need for construction or expansion of recreational facilities beyond what was anticipated in the General Plan or community plans.

Answers to Checklist Questions

a. Because the proposed project would not involve the construction of new homes, it would not directly result in an increased demand for neighborhood or regional parks, or other recreational facilities beyond those identified in the General Plan and considered in the MEIR. The proposed project would be consistent with the scope of the General Plan MEIR. This impact would be less than significant.

b. The existing Robert T. Matsui Waterfront Park and the Sacramento River Parkway bicycle path are both located adjacent to the project site. During construction, the proposed project would use both the existing sidewalks and landscaping adjacent to the Robert T. Matsui Waterfront Park. Depending on available right-of-way, the proposed project would construct the frontage (sidewalk and bike lane) for the planned science museum, which would fill the existing sidewalk gap on Jibboom Street. If the proposed project lacks available right-of-way to complete the science museum frontage, temporary asphalt sidewalks would be constructed and then replaced with permanent sidewalk when the science museum is constructed. These construction activities would occur directly adjacent to the Robert T. Matsui Waterfront Park, within the existing roadway, and would not have an impact on the park facilities.

As noted in Section 2, proposed project construction activities occurring adjacent to the existing Sacramento River Parkway bicycle path include repaving and restriping the southern portion of Jibboom Street. A concrete barrier, in place of the existing guardrail, would also be constructed at this location, as a safety measure for recreation users. To prevent a variation in ground levels between the existing bicycle path and the concrete barrier, a 2-foot-wide portion of dirt would be paved for the length of the concrete barrier using asphalt concrete pavement. The northbound lane of the Sacramento River Parkway bicycle path between Jibboom Street road stationing “B” 13+50 and 17+50 would be closed temporarily to allow equipment and contractor access and staging for construction of the concrete barrier and adjacent asphalt concrete pavement. The southbound bicycle lane would remain open during construction to ensure that the overall use of the bicycle path would not be affected. Additionally, a detour would be provided around the closed portion of the northbound bicycle lane. This detour would be provided only during the construction period in the immediate area of the concrete barrier and the adjacent asphalt concrete overlay. No actual improvements would be made to the bicycle path.

Construction of the concrete barrier and the asphalt concrete overlay between the concrete barrier and existing bicycle path would take approximately 2 weeks to complete. The construction of the improvements adjacent to the Sacramento River Parkway bicycle path corridor would not require long-term modification of the bicycle path route. If any modifications were to occur to the bicycle path or facilities (e.g., damage to pavement, striping, or signs), the bicycle path or facilities would be restored, at a minimum, to the conditions that existed before project implementation.

The proposed project improvements adjacent to the bicycle path, and the associated temporary detour on the northbound lane, would allow for continued, uninterrupted use of the southbound bicycle lane during the construction period. Once construction of the concrete barrier and asphalt concrete overlay adjacent to the existing bicycle path has been completed, use of the northbound bicycle lane would resume. These activities would not result in a substantial physical deterioration of the existing bicycle path. The proposed project would have a less-than-significant impact on existing recreational facilities.

Mitigation Measures

No mitigation measures would be required.

Findings

This project would have a less-than-significant impact on neighborhood or regional parks, other recreational facilities, and existing recreational opportunities.

	Impact for Which the General Plan MEIR Mitigates to a Less-than-Significant Level	Potentially Significant Impact That Requires Analysis in an EIR	Potentially Significant Impact Unless Mitigated	Less-than-Significant Impact
3.16 Mandatory Findings of Significance.				
a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, eliminate important examples of the major periods of California history or prehistory, or disturb paleontological resources?	☐	☐	☒	☐
b. Does the project have the potential to achieve short-term goals to the disadvantage of long-term environmental goals?	☐	☐	☐	☒
c. Does the project have impacts that are individually limited but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	☐	☐	☐	☒
d. Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☒	☐

Answers to Checklist Questions

a. The proposed project could have the following potentially significant impacts that could be reduced to a less-than-significant level through mitigation measures identified in this document.

The utility installation occurring under Railyards Boulevard and within the Sacramento River levee slope has the potential to compromise the stability of streambanks and levees on adjacent lands. Trench settlement and/or pipe failure could result from improper backfill of the excavation for the proposed utility lines under Railyards Boulevard. Implementation of Mitigation Measure 3.3-1, listed in section 3.3 “Seismicity, Soils, and Geology”, would reduce this potential impact to a less-than-significant level.

The proposed project would result in potential impacts on migratory birds, elderberry shrubs, burrowing owls, nesting Swainson’s hawks, and roosting bats. It would also potentially result in impacts on 36 trees protected by the City’s heritage tree ordinance and would result in impacts on 0.027 acre of depressional wetlands and 0.027 acre of drainage ditch. However, Mitigation Measures 3.7-1 through 3.7-7 listed in section 3.7, “Biological Resources,” would reduce these potential biological impacts to a less-than-significant level.

Construction of the proposed project would also result in ground-disturbing activities that could expose people to sources of potential health hazards related to hazardous materials. With implementation of Mitigation Measure 3.9-1, listed in section 3.9 “Hazards”, this potential impact would be reduced to a less-than-significant level.

As discussed in section 3.14, “Cultural Resources,” of this document, Sacramento is not considered highly sensitive for paleontological resources, and there are no known paleontological resources within the project area. There is, however, the possibility of unanticipated and accidental paleontological discoveries during ground-disturbing project-related activities. Implementation of Mitigation Measure 3.14-1 listed within this document would reduce this potential impact to a less-than-significant level.

Additionally, there is one non-significant archaeological resource within the project area, and site disturbance due to road and highways construction, commercial development, and installation of subsurface utilities renders the likelihood of discoveries to be low. Regardless, there is potential for project-related ground-disturbing activities to uncover such resources. However, implementation of Mitigation Measures 3.14-2, 3.14-3, and 3.14-4 would reduce this potential impact to a less-than-significant level.

b. Although the purpose of the project is to provide short-term operational, safety, and circulation improvements and access to areas planned for development in the City’s General Plan and specific plans, its construction would be built to accommodate a future interchange improvement project, as well as to handle the increases in traffic associated with initial development of the Richards Boulevard Redevelopment Area. Operation of the I-5/Richards Boulevard interchange off-ramps is currently deficient, as indicated by lengthy traffic queues onto mainline I-5 and Richards Boulevard during peak hours. The situation will continue to degrade as redevelopment occurs in the area unless improvements are made to the transportation system. Thus, in order to address the long-term capacity needs of the I-5/Richards Boulevard interchange and the increases in traffic associated with initial development of the Richards Boulevard Redevelopment Area, the short-term goals of the proposed project serve a similar purpose to that which would be established for the future upgrade under a future separate project.

Construction of the proposed project would result in both short-term and long-term potential impacts on the environment (see sections 3.3, “Seismicity, Soils, and Geology"; 3.7, "Biological Resources"; 3.9, "Hazards"; 3.10, "Noise"; 3.12, "Utilities"; 3.13, "Aesthetics"; and 3.14, "Cultural Resources"). However, all of these potential impacts have already been mitigated to less-than significant levels by measures and policies within the City's General Plan MEIR and within this document. Many of the proposed project's short-term environmental impacts also would occur under the future upgrade of the I-5/Richards Boulevard. Additionally, without the proposed project being built, continued development would incrementally increase congestion and exacerbate existing auto, truck, bicycle, and pedestrian circulation problems. No congestion relief would be provided, and access to the Railyards would not be built, thereby halting the redevelopment plan, which would be inconsistent with the City's General Plan and specific plans.

Because the impacts associated with the proposed project can be mitigated to a less-than-significant level, and because the proposed project would help alleviate the longer-term environmental concerns within the surrounding area, the project does not have the potential to achieve short-term goals to the disadvantage of long-term environmental goals.

c. The proposed project was assumed in the City's General Plan MEIR. Those environmental impacts associated with future, foreseeable projects anticipated to occur over the course of the City's General Plan (20–25 years) were analyzed within the MEIR. The proposed project would result in impacts that have been reduced to less-than-significant levels. Although these impacts may increase the magnitude of the impacts when combined with the impacts of past, current, and future projects, cumulative impacts are still considered less than significant. Mitigation measures identified in this document and within the City's General Plan MEIR would minimize the environmental impacts, which would be relatively small when considered in the overall scope of the MEIR. This impact is considered less than significant.

d. As discussed in section 3.9, "Hazards," the project has the potential for additional release of chemicals in locations where they are currently contained by a clay cap or asphalt on I-5. Impacts relating to the creation of health hazards would be significant unless mitigated.

Although the project has the potential to expose people to existing contamination and hazardous waste during construction activities, implementation of mitigation measure 3.9-1 would reduce impacts on human health to a less-than-significant level.

Findings

The project proposes a variety of activities that could have the potential to significantly affect the environment. However, mitigation measures provided in the City's General Plan MEIR, as well as within this document, would reduce all of these potential impacts to a less-than-significant level.

Section 4
Potentially Affected Environmental Factors

The project would potentially affect the environmental factors checked below.

☐	Land Use and Planning	☒	Hazards
☐	Population and Housing	☒	Noise
☒	Seismicity, Soils, and Geology	☐	Public Services
☐	Water	☐	Utilities and Service Systems
☐	Air Quality	☒	Aesthetics
☐	Transportation/Circulation	☒	Cultural Resources
☒	Biological Resources	☐	Recreation
☐	Energy and Mineral Resources	☒	Mandatory Findings of Significance
☐	None Identified		

Section 5
Determination

Based on this IS:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a **NEGATIVE DECLARATION** will be prepared.

☒ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions to the project have been made by or agreed to by the project proponent. A **MITIGATED NEGATIVE DECLARATION** will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an **ENVIRONMENTAL IMPACT REPORT** is required.

Jennifer H (signature) 10·15·09

Signature Date

Jennifer Hageman

Printed Name

Section 6
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Appendix A
Sensitive Species with Potential to Occur in the Project Region

Common and Scientific Name	Legal Status[a] (Federal/State/CNPS)	Geographic Distribution	General Habitat Description	Habitat Present/Absent	Rationale
Invertebrates					
Conservancy fairy shrimp *Branchinecta conservatio*	E/–	Limited to eight populations in the following counties: Butte, Tehama, Glenn, Yolo, Solano, Merced, Stanislaus, and Ventura	Inhabit large, cool-water pools with moderately turbid water	Absent	No suitable habitat exists within the biological study area
Vernal pool fairy shrimp *Branchinecta lynchi*	T/–	Central Valley; central and south Coast Ranges from Tehama County to Santa Barbara County; isolated populations also in Riverside County	Common in vernal pools; also found in sandstone rock outcrop pools	Absent	No suitable habitat exists within the biological study area
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	T/–	Riparian and oak woodland habitats below 3,000 feet throughout the Central Valley and surrounding foothills	Riparian and oak savanna habitats with elderberry shrubs, which are the host plant	Present	Several elderberry shrubs were identified within the biological study area; the species is known to occur at several locations along the Sacramento and American Rivers
Vernal pool tadpole shrimp *Lepidurus packardi*	E/–	Great Central Valley and the Sacramento River Delta to the east side of San Francisco Bay, California	Vernal pools and ephemeral stock ponds	Absent	No suitable habitat exists within the biological study area
Fish					
Green sturgeon *Acipenser medirostris*	T/SSC	In California, they are known to spawn in the Sacramento River and Klamath River Basin	An anadromous fish that spawns in deep pools or "holes" in large, turbulent, freshwater river mainstems; early life stages may remain in freshwater for up to 2 years	Absent	No suitable habitat exists within the biological study area
Sacramento perch *Archoplites interruptus*	–/SSC	Historically occurred throughout the Central Valley, in Clear Lake, and the Pajaro and Salinas Rivers; now occur in a few locations within their native range and have been introduced into several reservoirs and associated streams	Formerly inhabited sloughs, slow-moving rivers, and lakes, but are now found mostly in reservoirs and farm ponds	Absent	No suitable habitat exists within the biological study area

Common and Scientific Name	Legal Status[a] (Federal/State/CNPS)	Geographic Distribution	General Habitat Description	Habitat Present/Absent	Rationale
Delta smelt *Hypomesus transpacificus*	T/T	Are found only from the Suisun Bay upstream through the Delta in Contra Costa, San Joaquin, Sacramento, Solano, and Yolo Counties	Are found in euryhaline waters of the Delta; spawn in tidally influenced backwater sloughs and channel edgewaters	Absent	No suitable habitat exists within the biological study area
Central Valley steelhead *Oncorhynchus mykiss*	T/–	Sacramento and San Joaquin Rivers and their tributaries	An anadromous fish that spawns and spends a portion of its life in inland streams, typically maturing in the open ocean	Absent	No suitable habitat exists within the biological study area
Central Valley spring-run Chinook salmon *Oncorhynchus tshawytscha*	T/T	Sacramento and San Joaquin Rivers and their tributaries	An anadromous fish that spawns and spends a portion of its life in inland streams, typically maturing in the open ocean	Absent	No suitable habitat exists within the biological study area
Winter-run Chinook salmon, Sacramento River *Oncorhynchus tshawytscha*	E/E	Sacramento River and its tributaries	An anadromous fish that spawns and spends a portion of its life in inland streams, typically maturing in the open ocean	Absent	No suitable habitat exists within the biological study area
Sacramento splittail *Pogonichthys macrolepidotus*	–/SSC	Endemic to California, mainly to sloughs, lakes, and rivers of the Central Valley	Adapted for living in estuarine waters with fluctuating conditions; prefers slow-moving sections of rivers and sloughs; moves upstream during winter and spring months to forage and spawn	Absent	No suitable habitat exists within the biological study area
Amphibians					
California tiger salamander *Ambystoma californiense*	T/SSC	Occur in the Central Valley, including Sierra Nevada foothills, up to approximately 1,000 feet, and coastal region from Sonoma County south to Santa Barbara County, up to approximately 3,000 feet	Small ponds, lakes, or vernal pools in grasslands and oak woodlands for larvae; rodent burrows, rock crevices, or fallen logs for cover for adults	Absent	No suitable habitat exists within the biological study area

Common and Scientific Name	Legal Status[a] (Federal/State/CNPS)	Geographic Distribution	General Habitat Description	Habitat Present/Absent	Rationale
California red-legged frog *Rana aurora draytonii*	T/SSC	Historic range extended along the coast from the vicinity of Point Reyes National Seashore in Marin County, and inland from Shasta County south to Baja California; current known distribution is along the coast from Marin County south to Los Angeles County (with inland populations in San Bernardino and Riverside Counties), the inner Coast Range from Tehama County south to eastern San Luis Obispo County, and the Sierra Nevada from Butte County south to Tuolumne County	Permanent and semi-permanent aquatic habitats, such as creeks and coldwater ponds, with emergent and submergent vegetation and riparian species along the edges; may estivate in rodent burrows or cracks during dry periods	Absent	No suitable habitat exists within the biological study area, and the study area is outside of the known range for this species
Reptiles					
Western pond turtle *Actinemys marmorata*	–/SSC	The western pond turtle is uncommon to common in suitable aquatic habitat throughout California, west of the Sierra Nevada–Cascade crest and absent from desert regions, except in the Mojave Desert along the Mojave River and its tributaries	Occupies ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and with watercress, cattails, water lilies, or other aquatic vegetation in woodlands, grasslands, and open forests	Absent	No suitable habitat exists within the biological study area; though this species occurs in the nearby Sacramento and American Rivers, the project area does not support suitable upland habitat adjacent to potentially occupied aquatic habitat for this species
Giant garter snake *Thamnophis gigas*	T/T	Central Valley from Fresno north to the Gridley/Sutter Buttes area; has been extirpated from areas south of Fresno	Sloughs, canals, and other small waterways where there is a prey base of small fish and amphibians; requires grassy banks and emergent vegetation for basking and areas of high ground protected from flooding during winter	Absent	Habitat within the biological study area is not suitable; the drainage ditches are mostly dry during the spring, summer, and fall; a few small areas of the ditches are saturated due to irrigation runoff collecting there during these time periods; these ditches are not connected to any other habitat that would be considered suitable for giant garter snake

Common and Scientific Name	Legal Status[a] (Federal/State/CNPS)	Geographic Distribution	General Habitat Description	Habitat Present/Absent	Rationale
Birds					
Tricolored blackbird (nesting colony) *Agelaius tricolor*	–/SSC	Largely endemic to California; permanent residents in the Central Valley from Butte County to Kern County; at scattered coastal locations from Marin County south to San Diego County; breeds at scattered locations in Lake, Sonoma, and Solano Counties; rare nester in Siskiyou, Modoc, and Lassen Counties	Nests in dense colonies in emergent marsh vegetation, such as tules and cattails, or upland sites with blackberries, nettles, thistles, and grainfields; nesting habitat must be large enough to support 50 pairs; probably requires water at or near the nesting colony; requires large foraging areas, including marshes, pastures, agricultural wetlands, dairies, and feedlots, where insect prey is abundant	Absent	No suitable habitat exists within the biological study area; the depressional wetlands identified within the study area do not support dense emergent vegetation such as cattails and tules
Grasshopper sparrow *Ammodramus savannarum*	–/SSC	Summer resident and breeder in foothills and lowlands west of the Cascade–Sierra Nevada crest	Occurs in dry, dense grasslands, especially those with a variety of grasses and tall forbs and scattered shrubs for singing perches; nests in slight depressions in dense grasslands	Absent	Habitat within the biological study area is not suitable
Burrowing owl (burrow sites and some wintering sites) *Athene cunicularia*	–/SSC	Lowlands throughout California, including the Central Valley, northeastern plateau, southeastern deserts, and coastal areas; rare along south coast	Rodent burrows in sparse grass-land, desert, and agricultural habitats	Present	Ground squirrel burrows were identified within the southeast corner of the interchange, which represent potential habitat for burrowing owls; however, foraging opportunities in and in the vicinity of this area are limited in size; no burrowing owls, or sign of burrowing owls, were observed during the reconnaissance level surveys
Swainson's hawk (nesting) *Buteo swainsoni*	–/T	Lower Sacramento and San Joaquin Valleys, the Klamath Basin, and Butte Valley; the state's highest nesting densities occur near Davis and Woodland, Yolo County	Nests in small stands of oaks or cottonwoods in or near open riparian habitats; forages in grasslands, irrigated pastures, and grain fields adjacent to nest locations	Present	Suitable nesting habitat exists within the biological study area, but these areas are not adjacent to suitable foraging habitat, and thus the suitability is considered low

Common and Scientific Name	Legal Status[a] (Federal/State/CNPS)	Geographic Distribution	General Habitat Description	Habitat Present/Absent	Rationale
Western snowy plover *Charadrius alexandrines nivosus*	T/SSC	Nests at inland lakes throughout northeastern, central, and southern California, including Mono Lake and Salton Sea	Barren to sparsely vegetated ground at alkaline or saline lakes, reservoirs, ponds, and riverine sand bars; also along sewage, salt-evaporation, and agricultural waste-water ponds	Absent	No suitable habitat nesting exists within the biological study area
Mountain plover *Charadrius montanus*	–/SSC	Does not breed in California; in winter, found in the Central Valley south of Yuba County, along the coast in parts of San Luis Obispo, Santa Barbara, Ventura, and San Diego Counties; parts of Imperial, Riverside, Kern, and Los Angeles Counties	Occupies open plains or rolling hills with short grasses or very sparse vegetation; nearby bodies of water are not needed; may use newly plowed or sprouting grainfields	Absent	No suitable habitat exists within the biological study area
Western yellow-billed cuckoo *Coccyzus americanus occidentalis*	C/E	Nests along the upper Sacramento, lower Feather, south fork Kern, Amargosa, Santa Ana, and Colorado Rivers	Wide, dense riparian forests with a thick understory of willows for nesting; sites with a dominant cottonwood overstory are preferred for foraging; may avoid valley-oak riparian habitats where scrub jays are abundant	Absent	A small stand of riparian trees does occur within the study area and along the adjacent Sacramento River; however these riparian areas are relatively narrow and lack thick understories of willows. Also, the species is not known to nest along the lower Sacramento River. The nearest extant nesting populations are to the north in Yuba County.
White-tailed kite (nesting) *Elanus leucurus*	–/FP	Lowland areas west of Sierra Nevada from the head of Sacramento Valley south, including coastal valleys and foothills to western San Diego County at the Mexico border	Low foothills or valley areas with valley or live oaks, riparian areas, and marshes near open grasslands for foraging	Present	There are trees within the project area that could be used for nesting; however this species typically nests adjacent to preferred foraging habitat (open grasslands)

Common and Scientific Name	Legal Status[a] (Federal/State/CNPS)	Geographic Distribution	General Habitat Description	Habitat Present/Absent	Rationale
Purple martin *Progne subis*	–/SSC	Coastal mountains south to San Luis Obispo County, west slope of the Sierra Nevada, and northern Sierra and Cascade ranges; absent from the Central Valley except in Sacramento; isolated, local populations in southern California	Nests in abandoned woodpecker holes in oaks, cottonwoods, and other deciduous trees in a variety of wooded and riparian habitats; also nests in vertical drainage holes under elevated freeways and highway bridges	Present	Suitable habitat exists within the biological study area. Cottonwood trees in the biological study area could provide nesting habitat for this species. Species is known to nest in weep holes on the underside of the ramp to the I Street Bridge, which is located approximately 0.5 mile south of the biological study area.
Bank swallow *Riparia riparia*	–/T	Occurs along the Sacramento River from Tehama County to Sacramento County, along the Feather and lower American Rivers, in the Owens Valley; and in the plains east of the Cascade Range in Modoc, Lassen, and northern Siskiyou Counties; small populations near the coast from San Francisco County to Monterey County	Nests in bluffs or banks, usually adjacent to water, where the soil consists of sand or sandy loam	Absent	No suitable habitat exists within the biological study area or in areas adjacent
Yellow-headed blackbird *Xanthocephalus xanthocephalus*	–/SSC	Breeds east of Cascade Range and Sierra Nevada in the Central Valley, Imperial Valley, and Colorado River valleys	Nesting colonies located in large, dense emergent wetlands, often consisting of tules, cattails, or other tall plants along the borders of lakes or ponds; nests and roosts are over deep water; winters in southwest United States and Mexico	Absent	No suitable habitat exists within the biological study area

Common and Scientific Name	Legal Status[a] (Federal/State/CNPS)	Geographic Distribution	General Habitat Description	Habitat Present/Absent	Rationale
Mammals					
Pallid bat *Antrozous pallidus*	–/SSC	Throughout California, primarily at lower elevations and mid-elevations	Occurs in a variety of habitats from desert to coniferous forest; most closely associated with oak, yellow pine, redwood, and giant sequoia habitats in northern California; prefers rocky outcrops, cliffs, and crevices with access to open habitats for foraging; uses caves, crevices, mines, and hollow trees for roosting	Present	Suitable habitat exists within the study area. Species could roost in trees within the study area. No crevices or seams were identified in the I-5 overpasses, and no bat guano was observed beneath these areas.
Townsend's big-eared bat *Corynorhinus townsendii*	–/SSC	Widespread throughout California	Roosts in caves, tunnels, mines, crevices, hollow trees, and buildings; usually near water	Present	Suitable habitat exists within the study area. Species could roost in trees within the study area. No crevices or seams were identified in the I-5 overpasses, and no bat guano was observed beneath these areas.
American badger *Taxidae taxus*	–/SSC	Statewide except for the northwestern corner in Del Norte County and parts of Humboldt and Siskiyou Counties	Typically found in drier open stages of most shrub, forest, and herbaceous habitats with dry, friable soils	Absent	No badger dens were identified within the biological study area
Plants					
Ferris' milk-vetch *Astragalus tener* var. *ferrisiae*	–/–/1B.1	Historic range included the Central Valley from Butte to Alameda Counties; currently only occurs in Butte and Glenn Counties	Seasonally wet areas in meadows and seeps, subalkaline flats in valley and foothill grassland; 16–246 feet; blooms April–May	Absent	No meadows, seeps, or subalkaline flats present
Alkali milk-vetch *Astragalus tener* var. *tener*	–/–/1B.2	Southern Sacramento Valley, northern San Joaquin Valley, and eastern San Francisco Bay area	Playas, on adobe clay in valley and foothill grassland, vernal pools on alkali soils; below 196 feet; blooms March–June	Absent	No vernal pools, playas, or adobe clay soils present

Common and Scientific Name	Legal Status[a] (Federal/State/CNPS)	Geographic Distribution	General Habitat Description	Habitat Present/Absent	Rationale
Heartscale *Atriplex cordulata*	–/–/1B.2	Western Central Valley and valleys of adjacent foothills	Saline or alkaline soils in chenopod scrub, meadows and seeps, sandy areas in valley and foothill grassland; below 1,230 feet; blooms April–October	Absent	No chenopod scrub, meadows and seeps, or sandy areas in grassland present; not observed during surveys within blooming period
Brittlescale *Atriplex depressa*	–/–/1B.2	Western and eastern Central Valley and adjacent foothills on west side of Central Valley	Alkaline or clay soils in chenopod scrub, meadows and seeps, playas, valley and foothill grassland, vernal pools; below 1,050 feet; blooms May–October	Absent	No chenopod scrub, meadows and seeps, playas, vernal pools, or alkaline soils present; not observed during surveys within blooming period
San Joaquin spearscale *Atriplex joaquiniana*	–/–/1B.2	Western margin of Central Valley from Glenn County to Tulare County	Alkaline soils in chenopod scrub, meadows and seeps, playas, valley and foothill grassland; below 2,739 feet; blooms April–October	Absent	No chenopod scrub, meadows and seeps, playas, or alkaline soils present; not observed during surveys within blooming period
Succulent owl's-clover *Castilleja campestris* ssp. *succulenta*	T/E/1B.2	Southern Sierra Nevada foothills and eastern San Joaquin Valley	Vernal pools, often acidic; 164–2,460 feet; blooms April–May	Absent	No vernal pools present and species occurs outside elevation of study area
Palmate-bracted bird's-beak *Cordylanthus palmatus*	E/E/1B.1	Livermore Valley and scattered locations in the Central Valley from Colusa to Fresno Counties	Alkali grasslands, alkali meadows, chenopod scrublands; 16–508 feet; blooms May–October	Absent	No alkali grasslands, alkali meadows, or chenopod scrublands present
Dwarf downingia *Downingia pusilla*	–/–/2.2	Inner North Coast Ranges, southern Sacramento Valley, and northern and central San Joaquin Valley	Vernal pools and mesic areas in valley and foothill grasslands; below 1,460 feet; blooms March–May	Absent	No vernal pools or mesic areas present
Stinkbells *Fritillaria agrestis*	–/–/4.2	Outer North Coast Ranges, Sierra Nevada foothills, Central Valley, and Central Western California	Clay, sometimes serpentine soils in chaparral, cismontane woodland, pinyon-juniper woodland, valley and foothill grassland; 33–5,102 feet; blooms March–June	Absent	No chaparral, cismontane woodland, pinyon-juniper woodland, or serpentine soils present, and species occurs outside elevation of study area

Common and Scientific Name	Legal Status[a] (Federal/State/CNPS)	Geographic Distribution	General Habitat Description	Habitat Present/Absent	Rationale
Boggs Lake hedge hyssop *Gratiola heterosepala*	–/E/1B.2	Inner North Coast Ranges, central Sierra Nevada foothills, Sacramento Valley, and Modoc Plateau	Clay soils in marshes and swamps along lake margins, vernal pools; 33–7,792 feet; blooms April–August	Absent	No marshes, swamps, or vernal pools present
Rose-mallow *Hibiscus lasiocarpus*	–/–/2.2	Central and southern Sacramento Valley, deltaic Great Valley; central to southeastern United States	Freshwater marshes and swamps; below 394 feet; blooms June–September	Absent	No marshes or swamps present
Northern California black walnut *Juglans hindsii*	–/–/1B.1	Last two native stands in Napa and Contra Costa Counties; historically widespread through southern Inner North Coast Ranges, southern Sacramento Valley, northern San Joaquin Valley, San Francisco Bay Area	Riparian scrub and riparian woodland; below 1,443 feet; blooms April–May	Present	Potential habitat present in Great Valley cottonwood riparian forest, but no native stands observed during surveys
Legenere *Legenere limosa*	–/–/1B.1	Sacramento Valley, North Coast Ranges, northern San Joaquin Valley, and Santa Cruz mountains	Vernal pools; below 2,887 feet; blooms April–June	Absent	No vernal pools present
Heckard's peppergrass *Lepidium latipes* var. *heckardii*	–/–/1B.2	Southern Sacramento Valley	Alkaline flats in valley and foothill grassland; 33–656 feet; blooms March–May	Absent	No alkaline flats present and species occurs outside elevation of the study area
Little mousetail *Myosurus minimus* ssp. *apus*	–/–/3.1	Scattered occurrences from Colusa County to San Diego County	Alkaline soils in valley and foothill grassland, vernal pools; 66–2,100 feet; blooms March–June	Absent	No vernal pools or alkaline soils present
Baker's navarretia *Navarretia leucocephala* spp. *bakeri*	–/–/1B.1	Inner North Coast Ranges and western Sacramento Valley	Mesic areas in cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grassland, vernal pools; 16–5,709 feet; blooms April–July	Absent	No cismontane woodland, lower montane coniferous forest, meadows and seeps, vernal pools, or mesic areas present
Colusa grass *Neostapfia colusana*	T/E/1B.1	Central Valley with scattered occurrences from Colusa County to Merced County	Adobe soils of vernal pools; 16–656 feet; blooms May–August	Absent	No vernal pools present

Common and Scientific Name	Legal Status[a] (Federal/State/CNPS)	Geographic Distribution	General Habitat Description	Habitat Present/Absent	Rationale
Antioch Dunes evening-primrose *Oenothera deltoides* ssp. *howellii*	E/E/1B.1	Known from only three native occurrences in Sacramento and Contra Costa Counties	Inland dunes below 98 feet; blooms March–September	Absent	No inland dunes present
Slender Orcutt grass *Orcuttia tenuis*	T/E/1B.1	Inner North Coast Ranges, and Cascade Range foothills	Vernal pools; 115–5,774 feet; blooms May–September, uncommonly October	Absent	No vernal pools present
Sacramento Orcutt grass *Orcuttia viscida*	E/E/1B.1	Known only from Sacramento County	Vernal pools; 98–328 feet; blooms April–July	Absent	No vernal pools present
Sanford's arrowhead *Sagittaria sanfordii*	–/–/1B.2	Scattered locations in Central Valley and Coast Ranges from Del North to Fresno Counties	Freshwater marshes, sloughs, canals, and other slow-moving water habitats; below 2,132 feet; blooms May–October	Absent	No marshes, sloughs, canals, or slow-moving water habitats present
Crampton's tuctoria *Tuctoria mucronata*	E/E/1B.1	Southwestern Sacramento Valley, and Solano and Yolo Counties	Mesic areas in valley and foothill grassland, vernal pools; 16–33 feet; blooms April–August	Absent	No vernal pools or mesic areas present

[a] Status explanations:

Federal

E = listed as endangered under the federal Endangered Species Act.
T = listed as threatened under the federal Endangered Species Act.
C = proposed for listing under the federal Endangered Species Act.
D = delisted (delisted species are monitored for 5 years).
– = no listing.

State

E = listed as endangered under the California Endangered Species Act.
T = listed as threatened under the California Endangered Species Act.
FP = fully protected under the California Fish and Game Code.
SSC = species of special concern in California.
– = no listing.

California Native Plant Society (CNPS)

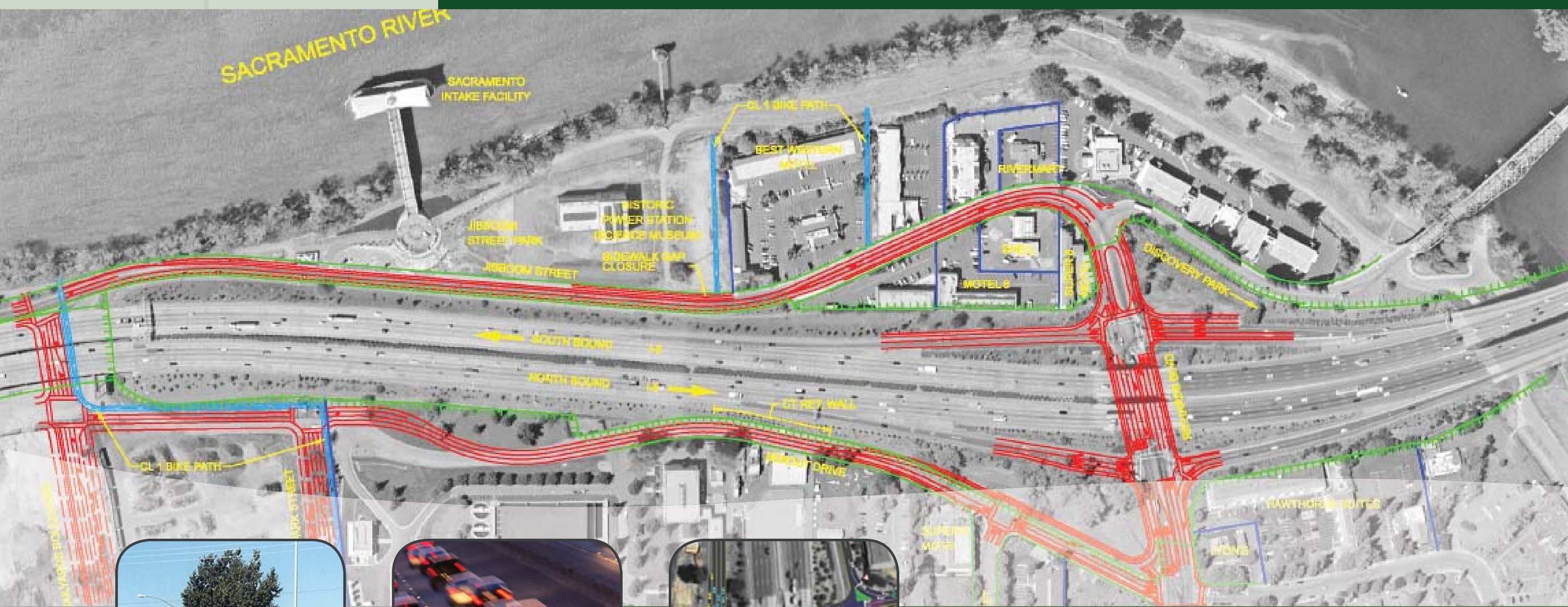
1B = List 1B species: rare, threatened, or endangered in California and elsewhere.
2 = List 2 species: rare, threatened, or endangered in California, but more common elsewhere.
3 = List 3 species: species for which more information is needed and are on a review list.
4 = List 4 species: species that have a limited distribution and are on a watch list.
0.1 = seriously endangered in California (more than 80% of occurrences threatened, or high degree and immediacy of threat).
0.2 = fairly endangered in California (20%–80% of occurrences threatened).

Appendix B

Final Traffic Study for the Interstate 5/ Richards Boulevard Interchange Access Improvements Study

Final Traffic Report for the

Interstate 5/Richards Boulevard Interchange Access Improvements Study



Submitted to: DAVID EVANS AND ASSOCIATES INC.

Submitted by: FEHR & PEERS TRANSPORTATION CONSULTANTS

January 7, 2009

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TRAFFIC REPORT

FOR THE INTERSTATE 5/RICHARDS BOULEVARD ACCESS IMPROVEMENTS STUDY

This report was prepared under my direction and responsible charge. I attest to the technical information contained herein and have judged the qualification of any technical specialists providing engineering data upon which recommendations, conclusions, and decisions are based.

1/7/09

John Gard, P.E. Date
Registered Professional Traffic Engineer
Fehr & Peers

REGISTERED PROFESSIONAL ENGINEER
JOHN THOMAS GARD
TR 2016
EXP. 6/09
TRAFFIC
STATE OF CALIFORNIA

1. INTRODUCTION

PURPOSE

This study analyzes existing and future transportation conditions in the vicinity of the Interstate 5 (I-5)/Richards Boulevard interchange in Sacramento, California. In response to existing congestion and planned development of the Railyards Specific Plan, a set of interim access improvements is proposed at the interchange and adjacent streets. Chapter IV describes these improvements in detail and presents the results of the traffic operations analysis for design year (2021) conditions.

The *Railyards Specific Plan Draft EIR* (2007) identified that the I-5/Richards Boulevard interchange would ultimately need to be reconstructed as a split-diamond interchange. Understanding that the ultimate improvements are many years away, the City is pursuing these interim improvements to provide near-term capacity enhancements. The City wants these interim improvements in place by 2011 to accommodate the initial phase of the Railyards Development.

STUDY AREA

The following three signalized intersections were analyzed for the weekday AM and PM peak hours under existing and design year (2021) conditions:

- Richards Boulevard/I-5 Southbound Ramps
- Richards Boulevard/I-5 Northbound Ramps
- Richards Boulevard/Bercut Drive

The analysis also included the mainline segments of I-5 north and south of the Richards Boulevard interchange.

ANALYSIS METHODOLOGY

Intersection Operations

The study intersections were analyzed using procedures and methodologies that are consistent with the *Highway Capacity Manual* (Transportation Research Board, 2000). The SimTraffic micro-simulation software package was used to evaluate vehicle delay, percent demand served, queue lengths, and travel times at the intersections. SimTraffic was selected for use as it considers the effects of signal coordination, closely spaced intersections, lane changing, and vehicle queuing on traffic operations. Per standard practice, ten SimTraffic runs were conducted for each scenario, and the results were averaged to yield the findings for each scenario.

To account for congestion that occurs during each peak hour, all scenarios assume a peak hour factor (PHF) of 0.92. The analysis also considers the effect of heavy vehicles on interchange operations. Under existing conditions, heavy vehicles comprise eight percent of AM peak hour and five percent of PM peak hour vehicles in the simulation model based on field observations. Under design year conditions, all scenarios assume that heavy vehicles account for two percent of traffic volumes. This lower heavy vehicle percentage reflects the larger share of residential and other non-industrial uses in the north central business district (CBD) area in the future.

The design year scenarios assume coordination and optimization of the signalized Richards Boulevard/I-5 SB Ramps, Richards Boulevard/I-5 NB Ramps, and Richards Boulevard/Bercut Drive intersections. The signal timing plans in place in 2006 were used to evaluate existing intersection operations.

At the outset of this study, the Project Development Team (PDT) agreed that the benefits of the interim improvements should not be measured using typical performance standards such as intersection level of service (LOS). Instead, the congestion relief and other benefits provided by the proposed interim improvements should be measured against “no build” conditions, using criteria such as:

- Change in vehicle delay.
- Change in percent of vehicle demand served during a single peak hour.
- Change in maximum vehicle queues.
- Change in severity and duration of congestion (i.e., peak hour spreading).
- Change in travel time for key movements through interchange.

Analysis of I-5 Mainline

Based on the presence of auxiliary lanes in both directions of I-5 between Garden Highway and I Street, the mainline segments north and south of the I-5/Richards Boulevard interchange were analyzed as weaving sections using the Leisch methodology, as specified in the *Highway Design Manual* (Caltrans, 2006).

2. EXISTING CONDITIONS

This chapter describes existing conditions in the vicinity of the I-5/Richards Boulevard interchange.

ROADWAY SYSTEM

The study area includes Richards Boulevard from west of I-5 to east of Bercut Drive and the I-5 mainline from the I Street interchange to the Garden Highway interchange. The following describes the key roadway facilities in the study area:

I-5 is a north-south interstate highway, which extends from the Mexican border to the Canadian Border. Through the study area, I-5 is an eight-lane freeway with auxiliary lanes in both directions between I Street and Garden Highway.

Richards Boulevard is a four-lane east-west arterial, which begins at Jibboom Street just west of I-5 and extends approximately 1.5 miles east through the City of Sacramento's north CBD, where it intersects with State Route160.

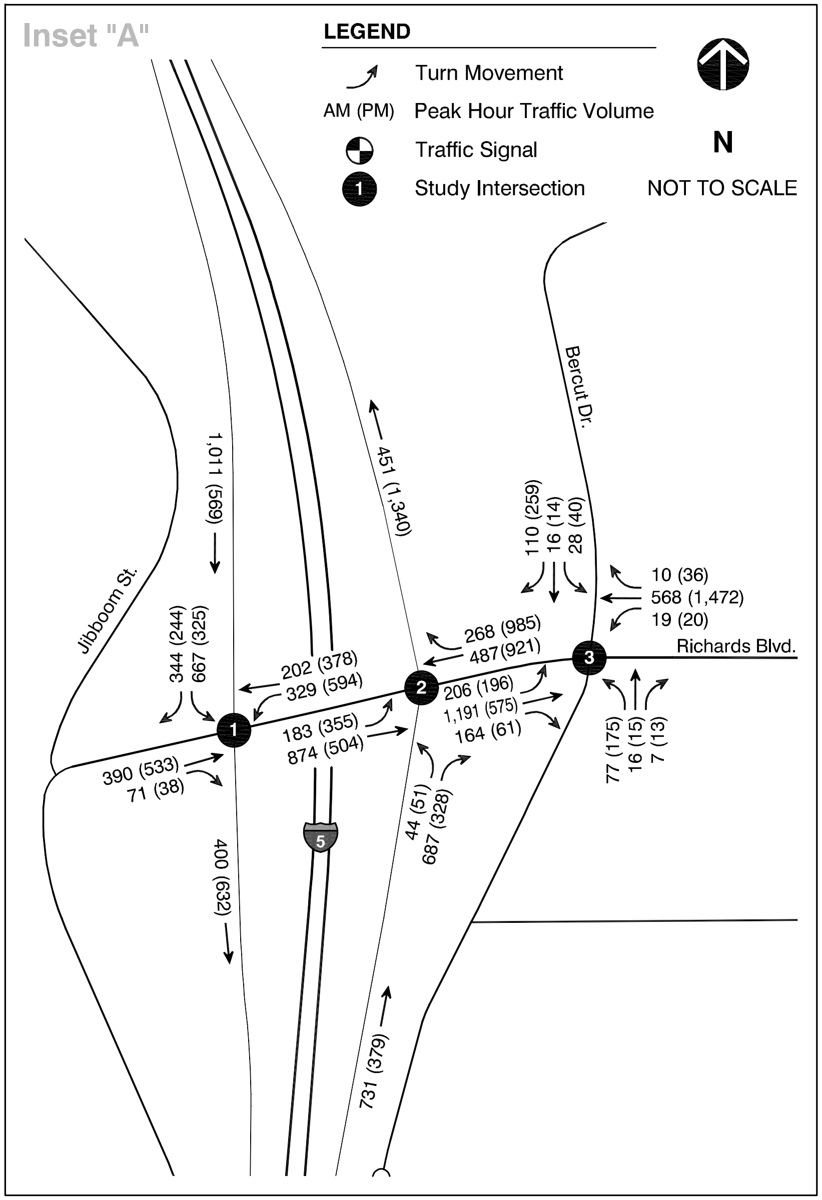
Jibboom Street is a two-lane street, which begins at I Street, extends northerly to Richards Boulevard, and then crosses the American River, terminating within Discovery Park.

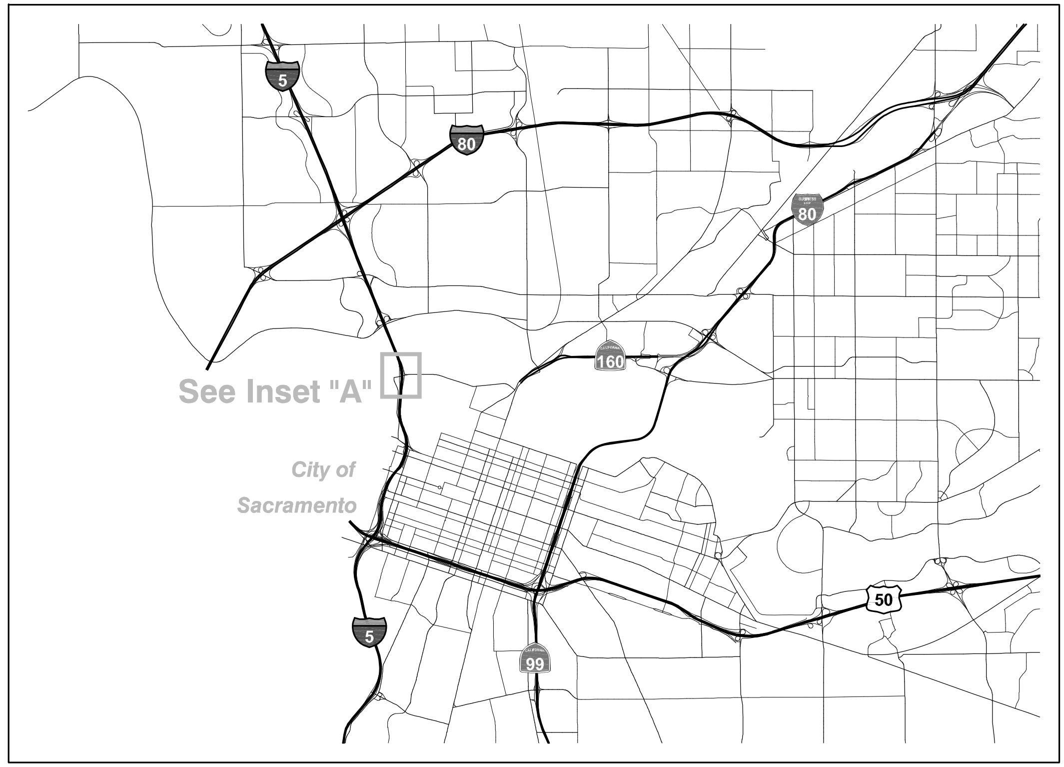
Bercut Drive is a two-lane street, which begins near the northern boundary of the Railyards site, extends northerly to Railyards Boulevard, and terminates at North 3rd Street.

Traffic Volumes

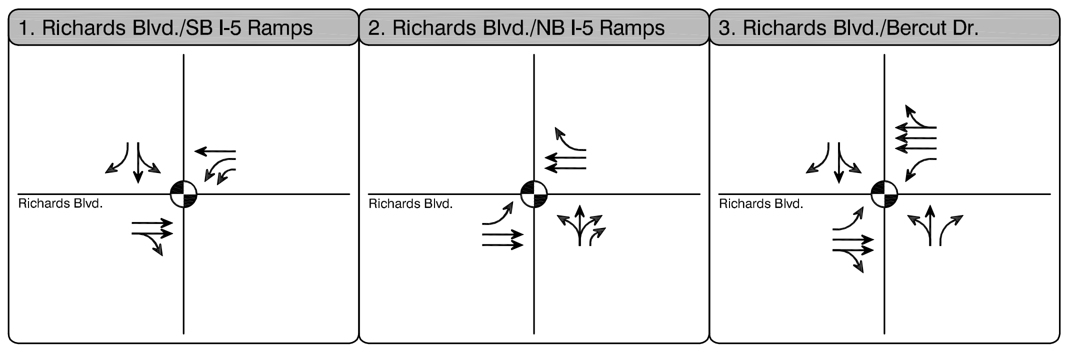
This study used traffic counts collected in June 2006 to assess existing traffic operations. These counts were also used in the *Railyards Specific Plan Draft EIR*. These volumes were considered reasonable for use because they were comparable to counts conducted by Caltrans in August 2007.

The existing volumes are presented on Figure 1. The figure also details the existing intersection geometrics and traffic control devices at the study intersections. As shown in Figure 1, I-5 southbound off-ramp volumes to Richards Boulevard are highest in the AM peak hour, with I-5 northbound on-ramp volumes from Richards Boulevard highest during the PM peak hour. This traffic pattern reflects the current land use characteristics of Sacramento's north CBD, which includes largely industrial/commercial uses and very little residential development.





Existing Conditions



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PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS - EXISTING CONDITIONS

FIGURE 1

Aug 19, 2008 SJR
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Intersection Operations

The results of the LOS analysis are presented in Table 1 (refer to Appendix A for technical calculations). During the AM peak hour, the Richards Boulevard/I-5 SB Ramps intersection features substantial delays. This is due, in part, to the heavy off-ramp left-turn volume (667 AM peak hour vehicles) that is served in a single lane. During the PM peak hour, substantial delays occur at the Richards Boulevard/Bercut Drive intersection.[1]

TABLE 1: AVERAGE VEHICLE DELAY – EXISTING CONDITIONS	
Intersection	**AM (PM) Peak Hour**
1. Richards Boulevard/I-5 Southbound Ramps	216 (72) sec/veh
2. Richards Boulevard/I-5 Northbound Ramps	16 (17) sec/veh
3. Richards Boulevard/Bercut Drive	11 (248) sec/veh

The AM peak hour operational results are generally comparable to findings presented in the *Railyards Specific Plan Draft EIR* (2007). However, the findings from the *Railyards Draft EIR* for the PM peak hour show much greater delays at the Richards Boulevard/I-5 NB Ramps and lesser delays at the Richards Boulevard/Bercut Drive intersection when compared to the data in Table 1. This is because the simulation model used in this study accounts for the close spacing of these two intersections, which affect vehicle queues, lane utilization, and saturation flow rates.

An inspection of the SimTraffic model reveals that it predicts vehicle queues that match field observations. Examples include:

- <u>AM Peak Hour</u>: Southbound off-ramp traffic spills back to the I-5 mainline.
- <u>PM Peak Hour</u>: Lengthy queues occur on the westbound Richards Boulevard approach to Bercut Drive.
- <u>Both Peak Hours</u>: The permissive left-turn phasing (now converted to protected) for the eastbound left-turn lane at the Richards Boulevard/Bercut Drive intersection results in moderate vehicle queues.

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[1] Some of the delay and queuing attributed to the Richards Boulevard/Bercut Drive intersection is due to vehicle spillbacks from the Richards Boulevard/I-5 NB Ramps intersection.

I-5 Mainline Operations

Table 2 displays the existing AM and PM peak hour directional volumes on I-5 across the American River. These volumes were obtained from the *I-5/I-80 Interchange Traffic Report* (Fehr & Peers, July 2008).

TABLE 2: TRAFFIC VOLUMES ON I-5 ACROSS THE AMERICAN RIVER – EXISTING CONDITIONS

Direction	AM (PM) Peak Hour
Northbound	5,530 (9,380) vehicles
Southbound	8,380 (6,920) vehicles

A VISSIM micro-simulation model of I-5 was developed as part of the I-5/I-80 study. The model analyzed traffic operations in the peak direction of I-5 between Richards Boulevard and Garden Highway. During the AM peak hour, the southbound direction of this segment operates at LOS D. During the PM peak hour, the northbound direction of this segment operates at LOS F.

BICYCLE AND PEDESTRIAN FACILITIES

The study area has several bicycle and pedestrian facilities. Richards Boulevard features sidewalks on both sides of the street from Jibboom Street east to beyond Bercut Drive. Crosswalks are provided at the three signalized study intersections. In addition, one crosswalk is provided across Richards Boulevard at each signalized intersection to accommodate pedestrians.

A class II bike lane is striped on both sides of Jibboom Street. In addition, a Class II bike lane also exists on both sides of Richards Boulevard east of North 3rd Street.

3. DESIGN YEAR (2021) TRAFFIC FORECASTS

To analyze design year (2021) traffic operations, traffic volume forecasts were developed for the I-5 mainline and the I-5/Richards Boulevard interchange.

FORECASTING METHODOLOGY

As part of the I-5 Bus/Carpool Lanes study, Fehr & Peers made several land use and roadway network modifications to the Year 2035 version of the SACMET travel demand model. As part of this study, Fehr & Peers made further modifications to the model to reflect the following:

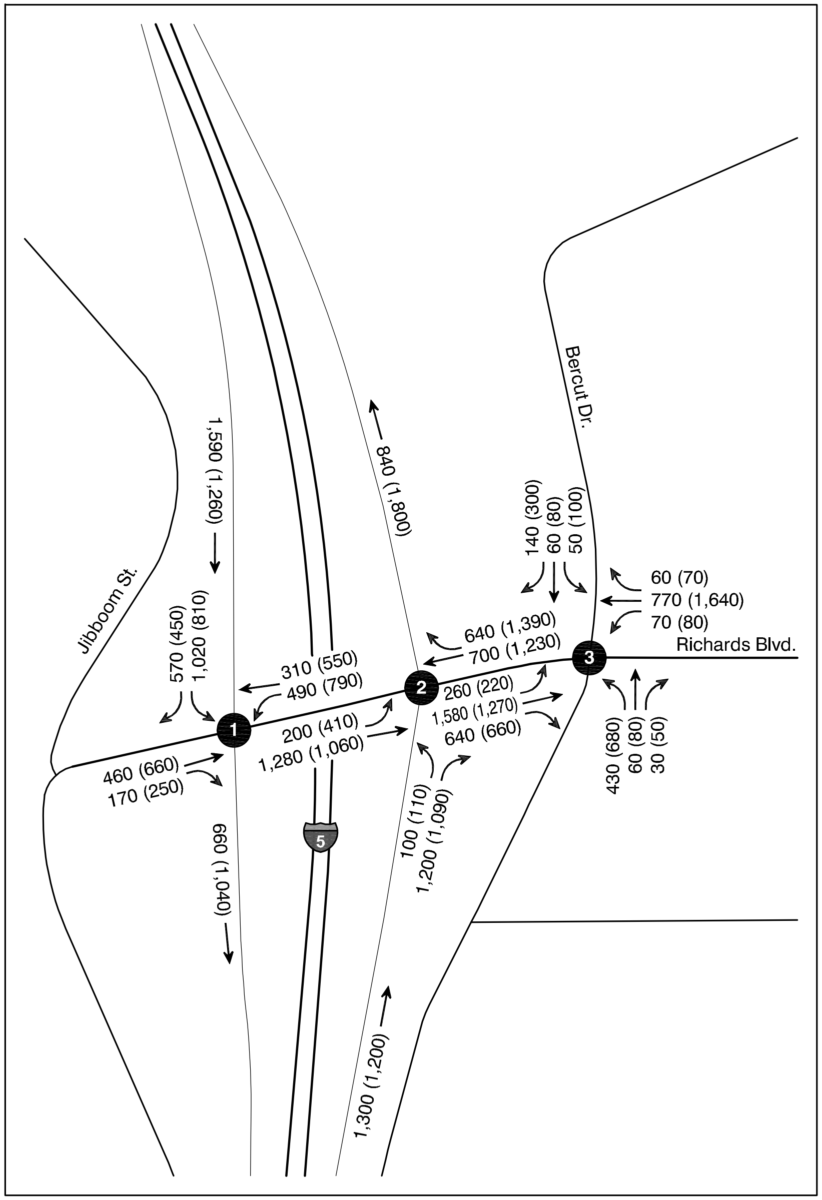
- Added latest proposed land use assumptions for Railyards Specific Plan, Township 9, and other nearby land use developments.
- Added latest roadway network system including coding of roadways with an adequate number of lanes to predict the unconstrained travel demand.
- Represented travel constraints such as one-lane ramps and ramp metering, which could affect travel demand.

Fehr & Peers used a process called “the difference method” to develop the design year traffic volume forecasts. Since the SACMET model does not forecast volumes for 2021, these volumes were developed by adding 50 percent of the growth in traffic between the cumulative (2035) and base year traffic model forecasts to the existing counts. This method assumes that approximately 50 percent of Railyards and Township 9 land uses would be absorbed and occupied by year 2021.

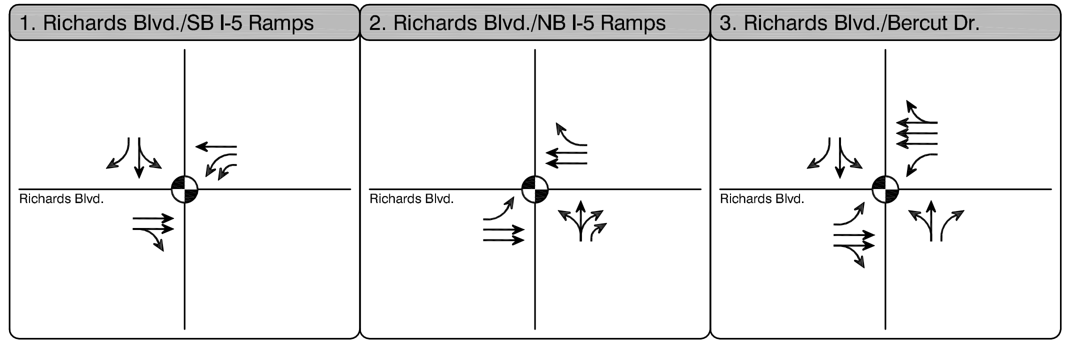
INTERCHANGE FORECASTS

Figure 2 shows the design year (2021) volumes forecasted at the I-5/Richards Boulevard interchange. A comparison of the design year forecasts to existing volumes reveals significant increases in traffic on all four ramps including:

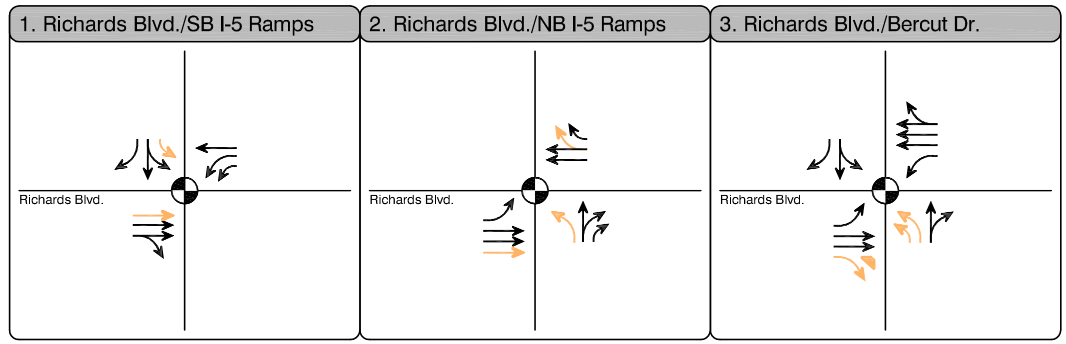
- <u>SB off-ramp</u>: AM peak hour volume increases from 1,010 to 1,590 and PM peak hour volume increases from 570 to 1,260.
- <u>SB on-ramp</u>: AM peak hour volume increases from 400 to 660 and PM peak hour volume increases from 630 to 1,040.
- <u>NB off-ramp</u>: AM peak hour volume increases from 730 to 1,300 and PM peak hour volume increases from 380 to 1,200.
- <u>NB on-ramp</u>: AM peak hour volume increases from 450 to 840 and PM peak hour volume increases from 1,340 to 1,800.



2021 No Project



2021 Plus Project



LEGEND

- Turn Movement
- Project Improvements
- AM (PM) Peak Hour Traffic Volume
- Traffic Signal
- Study Intersection

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PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS - DESIGN YEAR (2021) CONDITIONS

FIGURE 2

Dec 09, 2008 SJR
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The forecasts on Figure 2 were used to analyze design year operations under both "no project" and "with proposed improvements" conditions. The traffic forecasts on Figure 2 were reviewed by Caltrans and approved on July 31, 2008 (e-mail from Nadarajah Suthahar, Caltrans Office of Travel Forecasting and Modeling).

MAINLINE FORECASTS

Table 3 displays the existing volumes and design year (2021) traffic forecasts for I-5 north and south of the Richards Boulevard interchange. A comparison of the existing and design year forecasts yields the following conclusions:

- The Year 2021 forecasts are approximately 20 percent greater than existing volumes in the peak travel directions (i.e., southbound during the AM peak hour and northbound during the PM peak hour).
- The Year 2021 forecasts are approximately 40 percent greater than existing volumes in the non-peak travel directions (i.e., northbound during the AM peak and southbound during the PM peak hour).

A greater increase in traffic is expected in the non-peak travel directions for several reasons. First, I-5 has more available capacity in the non-peak directions to accommodate the increase in traffic. Also, the development of the Railyards and Township 9 introduces significant residential trip-making (primarily outbound in the AM peak hour and inbound during the PM peak hour), which adds trips in the non-peak travel directions.

TABLE 3: TRAFFIC VOLUMES ON I-5 ACROSS THE AMERICAN RIVER – DESIGN YEAR CONDITIONS

Direction	AM (PM) Peak Hour	
	Existing Conditions	Design Year (2021) Conditions
Northbound	5,530 (9,380) vehicles	7,710 (11,140)
Southbound	8,380 (6,920) vehicles	10,190 (9,500)

The design year forecasts are unconstrained, which means they do not consider potential upstream or downstream bottlenecks that could limit the traffic flow through this facility. The PDT discussed using constrained versus unconstrained volumes and agreed that the unconstrained volumes should be used for analysis purposes as this represents a more conservative assessment of projected traffic conditions within the study area.

4. DESIGN YEAR (2021) TRAFFIC OPERATIONS ANALYSIS

This chapter presents the traffic operations analysis of the I-5/Richards Boulevard interchange under design year (2021) conditions, without and with the proposed improvements on the state system.

PROPOSED IMPROVEMENTS

The proposed interim access improvements to the I-5/Richards Boulevard interchange and Richards Boulevard/Bercut Drive intersection include the following (refer to Figure 2):

Richards Boulevard/I-5 Southbound Ramps

- Widen the southbound off-ramp to include one left-turn lane, a shared through-left turn lane, and a right-turn lane.
- Provide a third through-lane on the eastbound Richards Boulevard approach.

Richards Boulevard/I-5 Northbound Ramps

- Widen the northbound off-ramp to include a left-turn lane, a shared through-right turn lane, and a right-turn lane.
- Provide a third through-lane on the eastbound Richards Boulevard approach.
- Modify the westbound Richards Boulevard approach to include a through-lane, a shared through-right turn lane, and a channelized right-turn lane.

Richards Boulevard/Bercut Drive

- Widen the northbound Bercut Drive approach to include two left-turn lanes and a shared through-right turn lane.
- Widen the eastbound Richards Boulevard approach to provide a channelized right-turn lane.

The design year (2021) traffic forecasts shown in Figure 2 were used to analyze both "no project" and "with project" conditions. However, both scenarios assume the following non-state system improvements (to be constructed to provide access to the Railyards Specific Plan):

- Extension of Bercut Drive to Railyards Boulevard
- Jibboom Street widening
- Railyards Boulevard connection from Bercut Drive to Jibboom Street (under I-5)

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INTERCHANGE OPERATIONS

To analyze how the proposed interim improvements would improve interchange operations under Year 2021 conditions, the "no project" and "with project' geometrics shown on Figure 2 were analyzed using the SimTraffic model. Appendix B contains technical calculations.

Average Delay Per Vehicle

Table 4 shows average intersection delay under design Year (2021) no project and plus project conditions. As shown, the proposed improvements would significantly reduce average vehicle delay at each intersection –in many cases reducing delay by half or more.

TABLE 4: AVERAGE VEHICLE DELAY – DESIGN YEAR CONDITIONS

Intersection	AM (PM) Peak Hour	
	No Project Conditions	Plus Project Conditions
1. Richards Boulevard/I-5 Southbound Ramps	394 (265) sec/veh	112 (150) sec/veh
2. Richards Boulevard/I-5 Northbound Ramps	342 (232) sec/veh	229 (88) sec/veh
3. Richards Boulevard/Bercut Drive	142 (457) sec/veh	67 (186) sec/veh

Percent of Vehicle Demand Served During Peak Hour

Table 5 compares the percentage of the peak hour vehicle travel demand that is able to be served within the hour at each intersection, without and with the proposed improvements. As shown, the proposed improvements would significantly increase the overall demand served at all intersections. System-wide, the proposed improvements would increase the percent demand served during the AM peak hour from about 65 to 80 percent. During the PM peak hour, the percent demand served would increase from about 62 to 78 percent.

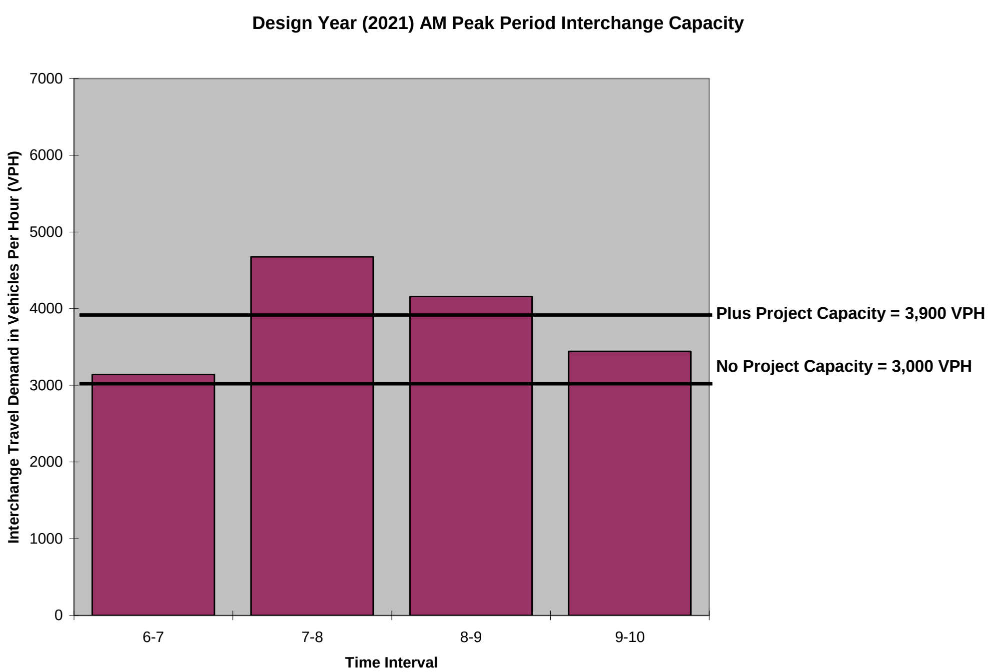
TABLE 5: PERCENT DEMAND SERVED – DESIGN YEAR CONDITIONS

Intersection	AM (PM) Peak Hour	
	No Project	Plus Project
1. Richards Boulevard/I-5 Southbound Ramps	64% (66%)	81% (79%)
2. Richards Boulevard/I-5 Northbound Ramps	64% (60%)	77% (76%)
3. Richards Boulevard/Bercut Drive	65% (60%)	83% (79%)

The percent demand served is a measure of the likely extent of peak hour spreading (i.e., LOS F conditions for multiple hours). Based on the increase in the percent demand served, the proposed improvements would allow the interchange to accommodate significantly more trips within each peak hour, thereby reducing the extent of peak hour spreading. The following charts show how the proposed improvements would increase hourly interchange capacity.

During the AM peak period (6-10 AM), the proposed improvements are estimated to increase the hourly interchange capacity from 3,000 to 3,900 vehicles per hour (VPH). This estimate is calculated using the peak hour demand and percent of it served within the hour. These capacity values are then plotted against the hourly demand during the AM peak period.

The hourly travel demand under design year conditions[2] would exceed the interchange's capacity under "no project" conditions for more than four hours in the morning (i.e., LOS F operations). By increasing the interchange's capacity, over-saturated conditions would be limited to two or three hours during the AM peak period.



During the PM peak period (3-7PM), the proposed improvements are estimated to increase the hourly interchange capacity from 3,700 to 4,700 VPH.[3] Although the interchange will remain at

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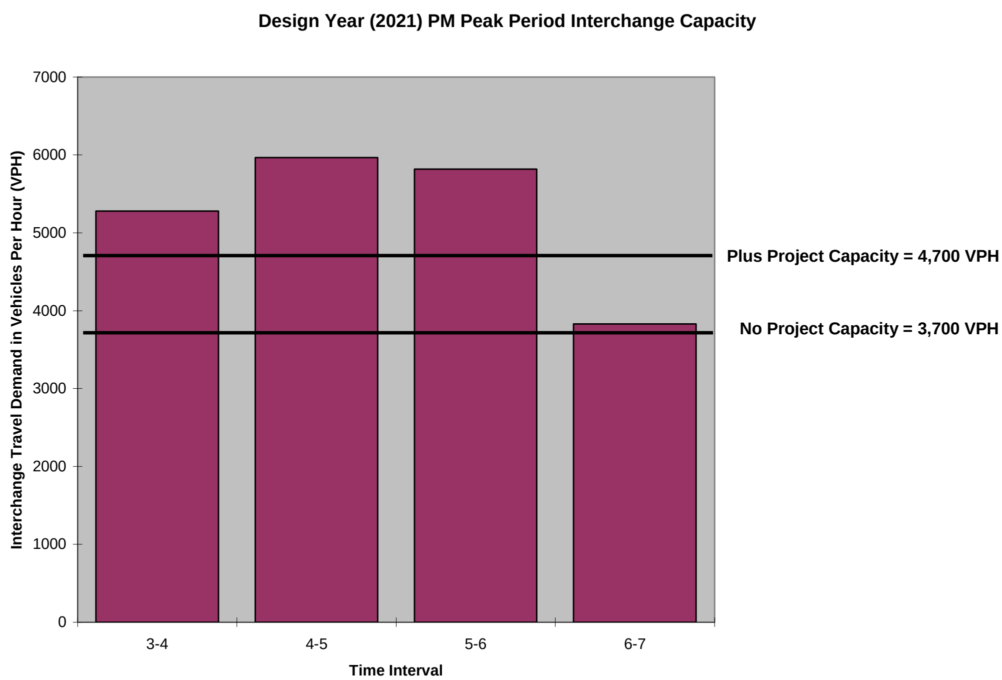
2 The hourly design year travel demand was estimated using the existing 8-hour counts from 2006, and the projected growth in peak hour traffic between existing and design year conditions.

3 The interchange has a higher hourly vehicle capacity during the PM peak hour due to differences in signal timings and peak directional vehicle flows.

or over capacity during much of the PM peak period with the proposed project in place, the severity and duration of the congestion is much less when compared to no project conditions.



Queue Lengths

Table 6 reports the 95th percentile queue lengths for key movements at the interchange. In most cases, the proposed improvements would reduce the queue length when compared to no project conditions. However, in a couple of instances, the proposed improvements would increase queues due to more traffic being able to drive through the interchange during the peak hour.

Table 6 indicates that the proposed improvements would have mixed results on queuing around the I-5/Richards Boulevard interchange:

- Southbound Off-Ramp: The proposed improvements would substantially reduce the extent of vehicle queuing during both peak hours. Although volumes would still queue back from the southbound off-ramp onto I-5 under design year conditions, the extent of these spillbacks is much less (3,000 feet to 4,000 feet less of queued vehicles) than under no project conditions. The results in Table 6 may slightly overstate the extent of vehicle queues on the southbound I-5 off-ramp. This is because the existing SimTraffic model estimates AM peak hour vehicle queues for this movement that extend onto I-5 almost to the American River Bridge. Field observations have not revealed this extent of queuing. It is likely that the same over-prediction that occurs in the existing conditions SimTraffic model also occurs in the design year SimTraffic model.

TABLE 6: 95TH PERCENTILE QUEUES – DESIGN YEAR CONDITIONS

Intersection	Movement	AM (PM) Peak Hour Queue Lengths	
		No Project	Plus Project
1. Richards Boulevard/ I-5 Southbound Ramps	SB Left	5,300 (5,800) ft.	2,300 (1,600) ft.
	SB Right	500 (450) ft.	190 (200) ft.
	EB Through	2,400 (5,800) ft.	3,700 (6,200) ft. [1]
2. Richards Boulevard/ I-5 Northbound Ramps	NB Right	5,300 (5,800) ft.	5,750 (5,100) ft. [2]
	EB Left	125 (175) ft.	300 (325) ft.[3]
3. Richards Boulevard/ Bercut Drive	NB Left	4,250 (5,300) ft.	450 (2,725) ft.
	WB Through	900 (6,850) ft.	900 (4,175) ft

Notes:

1 While queue length increases substantially on eastbound Jibboom Street/Richards Boulevard, the intersection as a whole serves a higher percent of demand. Percent demand served in the AM peak hour increases from 64 percent to 81 percent. Percent demand served in the PM peak hour increases from 66 percent to 79 percent.

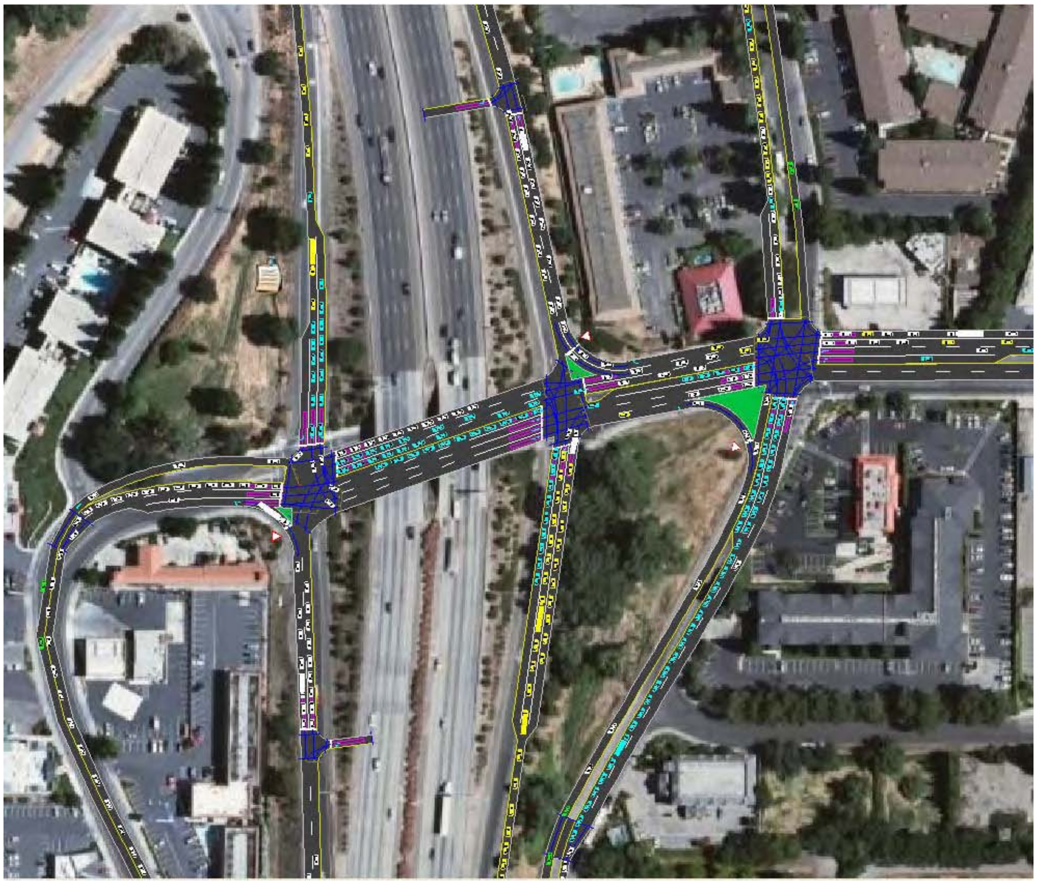
2 During the PM peak hour, the project reduces the off-ramp queue length by 700 feet. However, during the AM peak hour, forecasted volumes on the I-5 northbound off-ramp exceed capacity such that queue length remains at a mile or more, even with the project in place. The project does increase percent demand served for this movement from 59 percent to 63 percent during the AM peak hour.

3 Queues increase at this movement with the project because additional vehicles are able to be delivered to this intersection during the peak hour.

- Northbound I-5 Off-Ramp: The project would reduce queues on the I-5 northbound off-ramp during the PM peak hour. Queues would continue to spillback onto the mainline; however, the extent of this spillback would be reduced by 700 feet. During the AM peak hour, queuing on the northbound off-ramp would increase slightly; however, the percent of northbound off-ramp traffic served during the AM peak hour would increase.

- City Streets: Similar to the off-ramps, queuing increases in some locations and decreases in others. Increases in queue lengths are largely attributable to the proposed improvements enabling a higher percentage of vehicle demand to reach the study intersections during the peak hours.

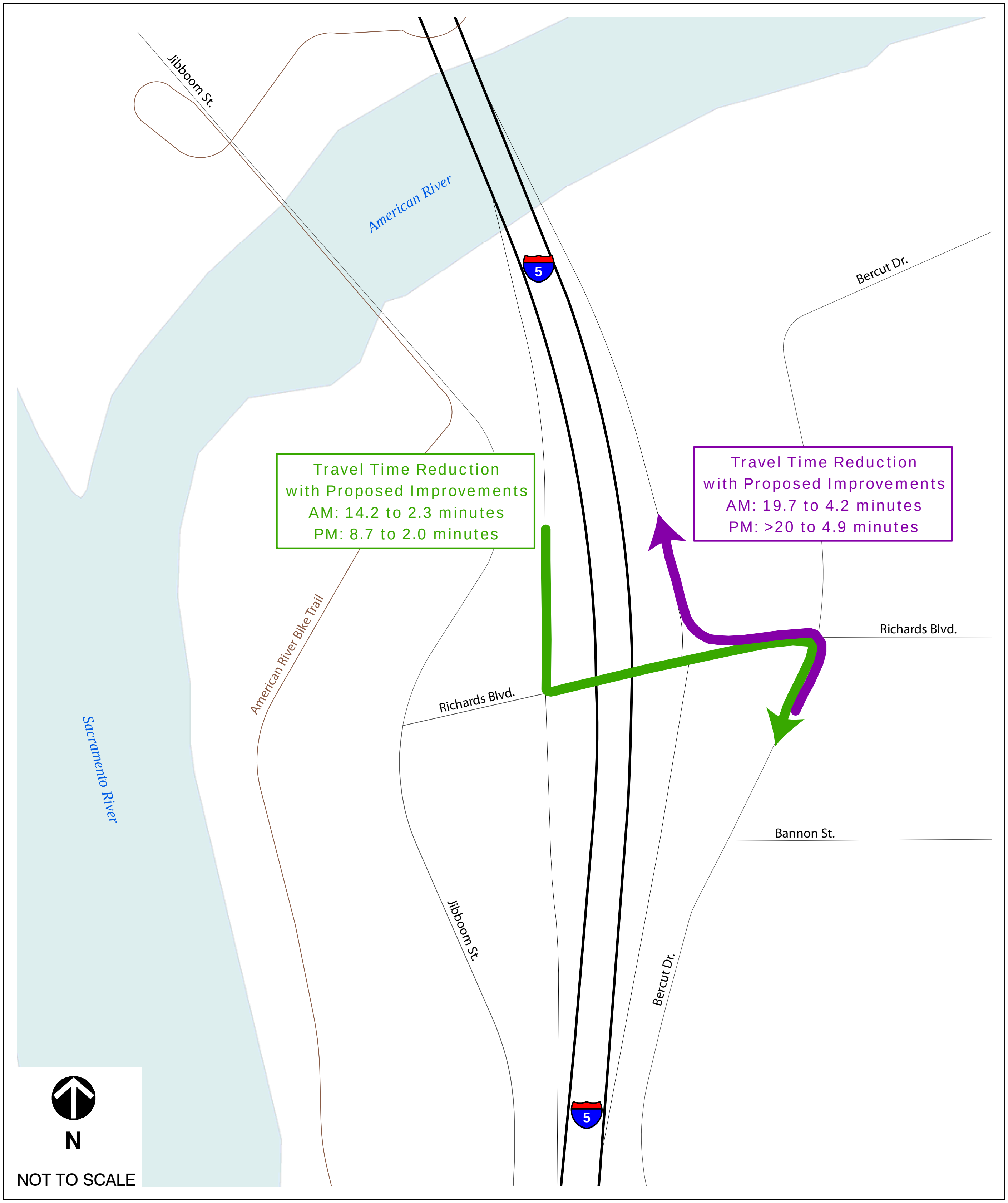
Despite improved operations over "no project" conditions, the study area would still experience significant queuing during peak periods with the proposed improvements in place. The following SimTraffic screenshot of PM peak operations shows evidence of these improvements.



Travel Times

Fehr & Peers compared travel times on two key travel routes through the I-5/Richards Boulevard interchange, without and with the proposed improvements. Figure 3 displays each route and their estimated travel times.

The first route (shown in green) represents the time it would take a motorist at the end of the southbound I-5 off-ramp queue to turn left onto eastbound Richards Boulevard and then turn right onto southbound Bercut Drive. SimTraffic projects an average travel time savings for this route of almost 12 minutes during the AM peak hour and about 6 minutes during the PM peak hour as a result of the proposed interim access improvements.



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DESIGN YEAR (2021) TRAVEL TIME COMPARISON

FIGURE 3

The second route (shown in purple) represents the time it would take a motorist at the end of the northbound Bercut Drive queue to turn left onto westbound Richards Boulevard and then turn right onto the northbound I-5 on-ramp. SimTraffic projects an average travel time savings for this route of over 15 minutes during each peak hour.

Ramp Meter Operations

Fehr & Peers performed a ramp metering analysis for the Richards Boulevard on-ramps to I-5. A ramp meter presently exists on the SB on-ramp. The proposed interchange improvements would construct a ramp meter on the NB on-ramp. The SimTraffic model used the ramp metering rates shown in Table 7 and concluded that traffic would spill back from each ramp meter into the upstream ramp terminal intersection on multiple occasions during each peak hour. This is due in part to large platoons of vehicles that arrive at the ramp meter, which immediately creates a lengthy queue that takes the ramp meter some time to disperse.[4] This phenomenon is illustrated by the SimTraffic screenshots on the following page.

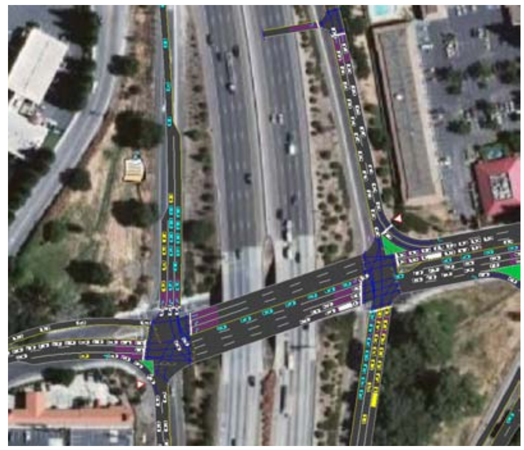
TABLE 7: CONSTRAINED ON-RAMP VOLUMES – DESIGN YEAR CONDITIONS

Intersection	Assumed Ramp Metering Rate	AM (PM) Peak Hour Constrained On-Ramp Volumes	
		No Project Conditions	Plus Project Conditions
SB I-5 On-Ramp from Richards Boulevard	740 (1,200)	462 (614) Vehicles	561 (770) Vehicles
NB I-5 On-Ramp from Richards Boulevard	800 (2,200)	622 (1,026) Vehicles	630 (1,296) Vehicles

The ramp metering analysis did not account for the potential spill back of traffic from I-5 onto the on-ramps. Because the I-5 weaving sections adjacent to the on-ramps are expected to operate at LOS E or F in Year 2021, on-ramp traffic may queue back into the ramp meters, thereby limiting their effectiveness.

[4] A ramp metering spreadsheet (that uses travel demand and ramp metering rate as inputs) is typically used to analyze the length of ramp vehicle queues. In this instance, the spreadsheet results were found to understate the length of queues primarily because the methodology was not sensitive to heavily platooned vehicle arrivals.

View of SB On-Ramp Queuing



View of NB On-Ramp Queuing

I-5 OPERATIONS

Traffic operations were analyzed for the weaving sections of I-5 located north and south of the Richards Boulevard interchange under design year conditions. Table 8 provides the results. These results are based on the amount of peak hour traffic from the Richards Boulevard interchange (as estimated by SimTraffic) that is able to access the on-ramps during the peak hour. As shown, all weaving sections are expected to operate at LOS E or F under Year 2021 conditions, with or without the proposed improvements.

The results of the SimTraffic model confirm the findings in Table 8. Vehicle queues from the Richards Boulevard off-ramps would spill back onto the mainline (in some cases in excess of one-mile), which would result in LOS F conditions throughout the weaving section.

TABLE 8: I-5 WEAVING SECTION ANALYSIS – DESIGN YEAR CONDITIONS

Intersection	AM (PM) Peak Hour Level of Service	
	No Project Conditions	Plus Project Conditions
SB I-5: Garden Highway to Richards Boulevard	F (F)	F (F)
SB I-5: Richards Boulevard to I Street	F (F)	F (F)
NB I-5: I Street to Richards Boulevard	F (F)	F (F)
NB I-5: Richards Boulevard to Garden Highway	E (F)	E (F)

5. DESIGN YEAR (2021) PROJECT ALTERNATIVES EVALUATION

In response to a request from Caltrans staff, Fehr & Peers analyzed three project alternatives to the proposed interim access improvements. Caltrans staff was interested in understanding whether any of these alternatives would provide any greater traffic operational benefits. Each alternative is described below, followed by the results of the operational analysis.

PROJECT ALTERNATIVES

The three project alternatives are described below and illustrated on Figure 4.

Alternative A

- Widen the eastbound approach to Richards Boulevard/Bercut Drive intersection to include one left-turn lane, two through lanes, and one shared through/right turn lane.

This alternative provides for additional eastbound through capacity on Richards Boulevard, but maintains providing only two southbound left-turn lanes at the southbound I-5 off-ramp.

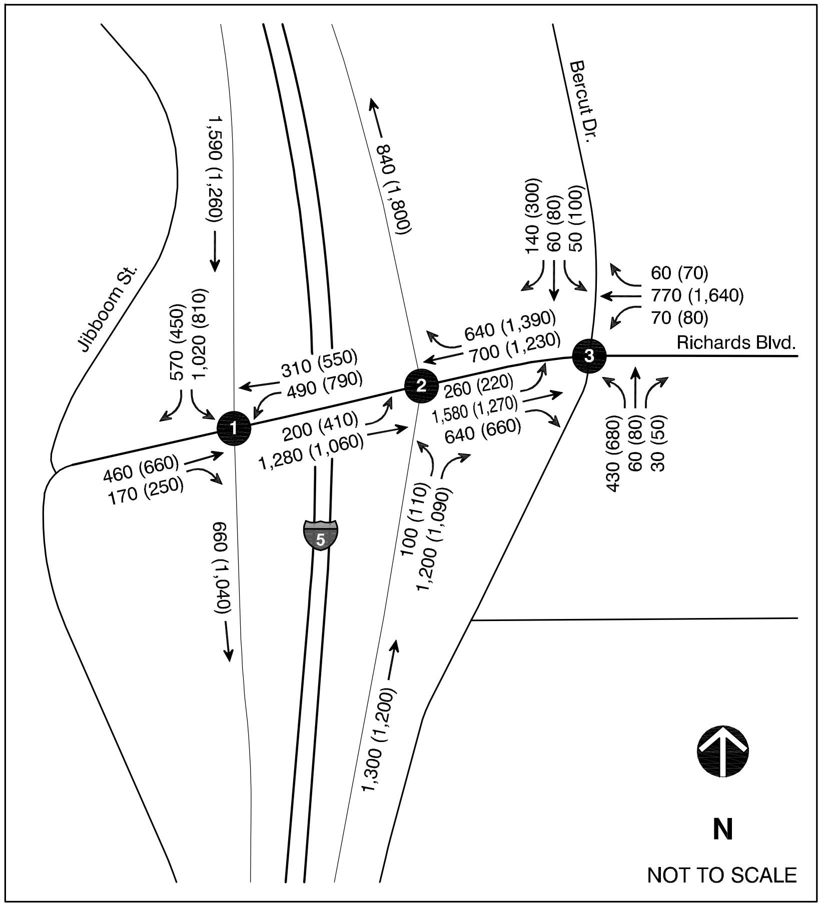
Alternative B

- Widen the southbound approach to the Richards Boulevard/I-5 Southbound Ramps intersection to include two left-turn lanes, one shared through/left turn lane, and one right-turn lane.

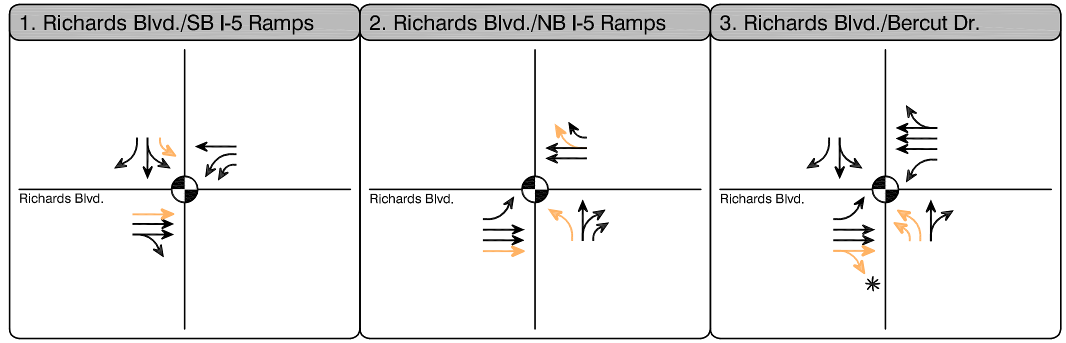
Alternative B was proposed as a means to increase capacity for southbound off-ramp traffic and reduce queues on the I-5 mainline. Since Richards Boulevard has only two eastbound lanes which continue all the way through the interchange (the third eastbound lane traps at Bercut Drive), this alternative would require motorists (particularly trucks) in the outside left-turn lane to merge into the middle through lane to avoid being forced to turn right at Bercut Drive.

Alternative A+B

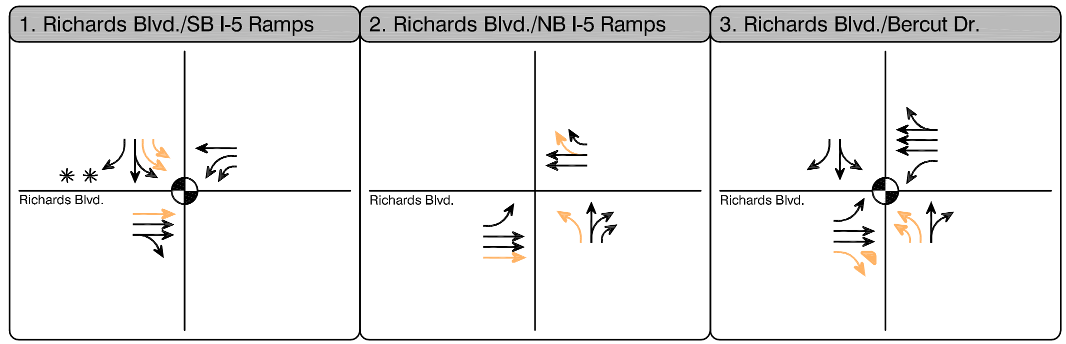
- Widen the southbound approach to the Richards Boulevard/I-5 Southbound Ramps intersection to include two left-turn lanes, one shared through/left turn lane, and one right-turn lane (same as Alternative A).
- Widen the eastbound approach to Richards Boulevard/Bercut Drive intersection to include one left-turn lane, two through lanes, and one shared through/right turn lane.



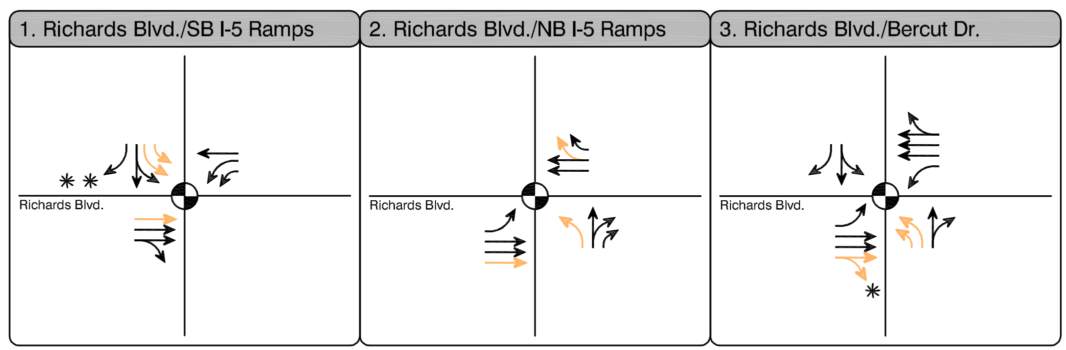
2021 Plus Project Alternative A



2021 Plus Project Alternative B



2021 Plus Project Alternatives A and B



LEGEND

- Turn Movement
- Project Improvements
- AM (PM) Peak Hour Traffic Volume
- Traffic Signal
- Study Intersection

NOTES:

* Alternative A provides a third EB through lane through Bercut Dr. (versus two through lanes under the proposed design).

* * Alternative B provides three left-turn lanes on the off-ramp (versus two with the proposed design).

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PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS - DESIGN YEAR (2021) CONDITIONS PROJECT ALTERNATIVES

FIGURE 4

Alternative A+B provides for the additional capacity on the southbound off-ramp while eliminating the "trap" right-turn movement on eastbound Richards Boulevard at Bercut Drive. This alternative could result in more balanced lane utilization at the upstream intersections. However, it could also result in greater delays and queuing for eastbound traffic because the heavy right-turn movement (about 650 vehicles during each peak hour) would be made from a shared through/right lane instead of an exclusive, channelized right-turn lane.

TRAFFIC OPERATIONS RESULTS

The alternatives were analyzed under design year (2021) conditions using the SimTraffic model. Table 9 compares average intersection delay under the proposed project with the project alternatives. Table 10 compares the percentage of vehicle demand served, while Table 11 compares displays 95th percentile queue lengths for key movements at the interchange. Appendix C provides all technical calculations.

TABLE 9: AVERAGE DELAY WITH PROJECT ALTERNATIVES – DESIGN YEAR CONDITIONS

Intersection	AM (PM) Peak Hour			
	Plus Project Conditions	Alternative A	Alternative B	Alternative A Plus B
1. Richards Boulevard/I-5 Southbound Ramps	112 (150) sec/veh	110 (146) sec/veh	129 (127) sec/veh	116 (158) sec/veh
2. Richards Boulevard/I-5 Northbound Ramps	229 (88) sec/veh	96 (67) sec/veh	130(68) sec/veh	84 (55) sec/veh
3. Richards Boulevard/Bercut Drive	67 (186) sec/veh	47 (227) sec/veh	53 (257) sec/veh	44 (231) sec/veh

TABLE 10: PERCENT DEMAND SERVED WITH PROJECT ALTERNATIVES – DESIGN YEAR CONDITIONS

Intersection	AM (PM) Peak Hour			
	Plus Project Conditions	Alternative A	Alternative B	Alternative A Plus B
1. Richards Boulevard/I-5 Southbound Ramps	81% (79%)	83% (76%)	83% (84%)	84% (76%)
2. Richards Boulevard/I-5 Northbound Ramps	77% (76%)	84% (77%)	82% (79%)	86% (78%)
3. Richards Boulevard/Bercut Drive	83% (79%)	87% (78%)	85% (77%)	89% (80%)

TABLE 11: 95TH PERCENTILE QUEUES WITH PROJECT ALTERNATIVES – DESIGN YEAR CONDITIONS					
Intersection	**Movement**	**AM (PM) Peak Hour Queue Lengths**			
		Plus Project	**Alternative A**	**Alternative B**	**Alternative A Plus B**
1. Richards Boulevard/ I-5 Southbound Ramps	SB Left	2,300 (1,600) ft.	3,900 (2,850) ft.	4,175 (3,200) ft.	3,200 (3,475) ft.
	SB Right	190 (200) ft.	175 (175) ft.	200 (200) ft.	200 (200) ft.
	EB Through	3,700 (6,200) ft.	2,375 (5,475) ft.	2,925 (4,275) ft.	2,450 ft (5,725) ft.
2. Richards Boulevard/ I-5 Northbound Ramps	NB Right	5,750 (5,100) ft.	5,000 (2,200) ft.	5,700 (3,800) ft.	4,750 (2,200) ft.
	EB Left	300 (325) ft.	325 (325) ft.	300 (325) ft.	325 (300) ft.
3. Richards Boulevard/ Bercut Drive	NB Left	450 (2,725) ft.	300 (2,800) ft.	350 (3,575) ft.	325 (3,500) ft.
	WB Through	900 (4,175) ft	500 (5,125) ft.	1,300(5,200) ft.	475 (5,075) ft.

Evaluation of Alternative A

When compared to the proposed access improvements, Alternative A would result in a similar level of delay at the I-5 Southbound Ramps/Richards Boulevard and Bercut Drive/Richards Boulevard intersections. The primary advantage of providing a third eastbound through lane at Bercut Drive, is that it provides additional eastbound through capacity for the I-5 northbound off-ramp. This additional through capacity translates in a substantial reduction in average vehicle delay at the northbound I-5 ramp terminal intersection and reduced queuing on the northbound off-ramp.

However, one significant drawback of this alternative is that it results in overutilization of the outside shared through/right lane on eastbound Richards Boulevard approaching Bercut Drive. This is illustrated in the "per lane off-ramp traffic volume" calculation shown on Figure C-2 in Appendix C. This lane would be used by the 640 AM peak hour vehicles to turn right onto Bercut Drive. It would also be used by trucks and passenger vehicles from the southbound off-ramp outside left-turn lane as well as the from outside right-turn lane from the northbound off-ramp. According to Figure C-1, the maximum per lane volume under design year AM peak hour conditions would increase from 790 vehicles with the proposed improvements to 1,040 vehicles under Alternative A.

Evaluation of Alternative B

Alternative B was proposed as a means to increase capacity for southbound off-ramp traffic and reduce queues on the I-5 mainline. Compared to the proposed improvements, reduced queuing on the southbound off-ramp was not observed under this alternative. This is because the Richards Boulevard corridor (including the adjacent study intersections) meters the amount of traffic that can exit the off-ramp. Moreover, since Richards Boulevard has only two eastbound lanes which continue all the way through the interchange (the third eastbound lane traps at Bercut Drive), this alternative also requires motorists (particularly trucks) in the outside left-turn lane to merge into the middle through lane to avoid being forced to turn right at Bercut Drive.

One advantage to a wider off-ramp is that it allows for more flexibility in setting signal timings at the off-ramp. With the proposed project, it would be necessary to maintain a very short cycle length in order to “flush” queued vehicles out of the off-ramp. With three left-turn lanes, cycle lengths can be longer as vehicles would have more room to stack.

Evaluation of Alternative A Plus B

Alternative “A Plus B” shows the additive effects of when Alternatives A and B are combined. A noticeable benefit of this alternative are the reduction in the 95th percentile queue length on the northbound off-ramp during the both peak hours. This is because the provision of three through lanes on eastbound Richards Boulevard through Bercut Drive facilitates the heavy volume of northbound off-ramp traffic desiring to travel eastbound on Richards Boulevard.

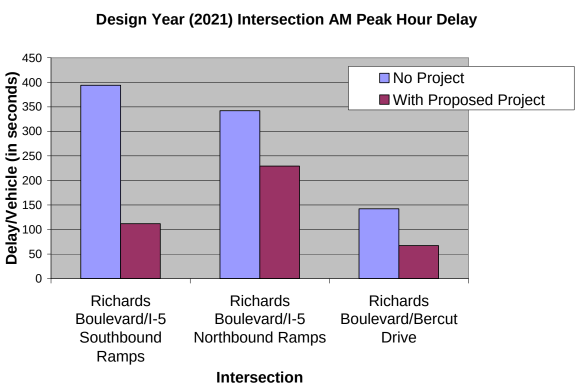
Alternative A+B provides for the additional capacity on the southbound off-ramp while eliminating the “trap” right-turn movement on eastbound Richards Boulevard at Bercut Drive. This alternative could result in more balanced lane utilization at the upstream intersections. However, it could also result in greater delays and queuing for eastbound traffic because the heavy right-turn movement (about 650 vehicles during each peak hour) would be made from a shared through/right lane instead of an exclusive, channelized right-turn lane.

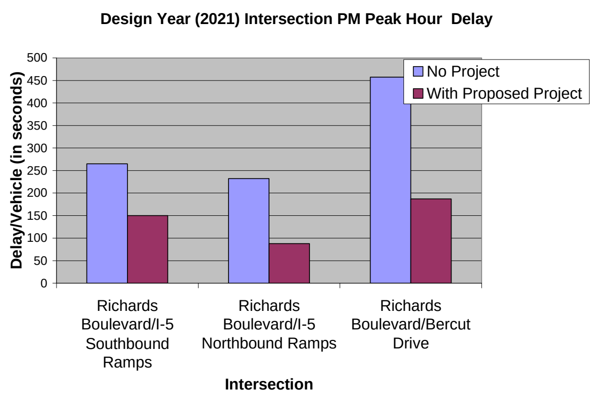
Also, similar to Alternative B, the provision of a wider I-5 southbound off-ramp allows for more flexibility in setting signal timings at the off-ramp as vehicles would have more room to stack.

6. CONCLUSIONS

This study found that the proposed access improvements at the I-5/Richards Boulevard interchange and the Richards Boulevard/Bercut Drive intersection would provide substantial travel benefits under design year (2021) conditions when compared to no project conditions. The following specific traffic operations benefits were identified:

1. Average delays at each intersection are substantially reduced as shown in these charts.





2. Average travel time through the interchange is substantially reduced. For example, a motorist exiting southbound I-5 at Richards Boulevard to access the Railyards Specific Plan would realize an 12 minute travel time savings during the morning peak hour.

3. Vehicle queues on the southbound off-ramp are significantly reduced. However, queuing from the off-ramp onto the I-5 mainline is still expected during peak hours.

4. Vehicle queues on the northbound off-ramp are significantly reduced during the PM peak hour. However, queuing from the off-ramp onto the I-5 mainline is still expected during both peak hours.

5. The I-5/Richards Boulevard interchange is able to serve more traffic during peak periods. This results in fewer hours of gridlock each day.

6. The project would improve bicycle and pedestrian circulation in the area by adding Class II bicycle lanes on Richards Boulevard, and upgrading pedestrian ramps, crosswalks, and sidewalks.

Appendix A: Existing Conditions Calculations

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: *I-5/Richards* ***HCM:*** *2000*
Scenario: *Existing Conditions* ***PHF:*** *0.92*
TOD: *AM* ***Analysis Period:*** *15 Minutes* ***# of Runs:*** *10*

Intersection: *1: Richards Blvd & I-5 SB Ramps* ***Type:*** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	L	181	120	66	5	683.5	F	--
	R	93	62	67	7	192.3	F	--
	Subtotal	**275**	**182**	**66**	--	**516.4**	**F**	--
EB	T	106	108	102	12	32.5	C	--
	R	19	19	100	3	10.3	B	--
	Subtotal	**125**	**127**	**102**	--	**29.2**	**C**	--
WB	L	89	91	102	8	6.0	A	--
	T	55	57	104	7	8.0	A	--
	Subtotal	**144**	**148**	**103**	--	**6.8**	**A**	--
	Total	**544**	**457**	**84**	--	**216.0**	**F**	--

Intersection: *2: Richards Blvd & I-5 NB Ramps* ***Type:*** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	12	12	100	5	26.4	C	--
	R	187	189	101	17	10.7	B	--
	Subtotal	**199**	**201**	**101**	--	**11.6**	**B**	--
EB	L	50	50	100	8	29.3	C	--
	T	238	178	75	10	16.5	B	--
	Subtotal	**287**	**228**	**79**	--	**19.3**	**B**	--
WB	T	132	133	100	9	24.3	C	--
	R	73	73	100	8	2.6	A	--
	Subtotal	**205**	**205**	**100**	--	**16.6**	**B**	--
	Total	**691**	**634**	**92**	--	**16.0**	**B**	--

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: *I-5/Richards* ***HCM:*** *2000*
Scenario: *Existing Conditions* ***PHF:*** *0.92*
TOD: *AM* ***Analysis Period:*** *15 Minutes* ***# of Runs:*** *10*

Intersection: *3: Richards Blvd & Bercut Dr* ***Type:*** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	21	21	100	6	28.5	C	--
	T	4	5	125	3	23.5	C	--
	R	2	2	100	1	13.2	B	--
	Subtotal	**27**	**28**	**104**	--	**26.5**	**C**	--
SB	L	8	7	88	2	29.3	C	--
	T	4	5	125	2	23.0	C	--
	R	30	31	103	6	8.8	A	--
	Subtotal	**42**	**43**	**102**	--	**13.8**	**B**	--
EB	L	56	52	93	7	11.7	B	--
	T	324	276	85	11	6.7	A	--
	R	45	41	89	6	6.7	A	--
	Subtotal	**424**	**368**	**87**	--	**7.4**	**A**	--
WB	L	5	5	100	2	48.8	D	--
	T	154	157	102	14	13.1	B	--
	R	3	2	67	1	11.5	B	--
	Subtotal	**162**	**164**	**101**	--	**14.2**	**B**	--
	Total	**655**	**603**	**92**	--	**10.6**	**B**	--

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5/Richards **HCM:** 2000
Scenario: Existing Conditions **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: Richards Blvd & I-5 SB Ramps **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	L	88	84	95	7	26.1	C	--
	R	66	67	102	7	7.8	A	--
	Subtotal	**155**	**151**	**97**	--	**18.0**	**B**	--
EB	T	145	122	84	9	241.6	F	--
	R	10	7	70	2	183.2	F	--
	Subtotal	**155**	**129**	**83**	--	**238.6**	**F**	--
WB	L	161	122	76	7	6.2	A	--
	T	103	85	83	13	8.8	A	--
	Subtotal	**264**	**207**	**78**	--	**7.3**	**A**	--
	Total	**574**	**486**	**85**	--	**71.7**	**E**	--

Intersection: 2: Richards Blvd & I-5 NB Ramps **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	14	16	114	5	25.4	C	--
	R	89	88	99	8	5.3	A	--
	Subtotal	**103**	**104**	**101**	--	**8.5**	**A**	--
EB	L	96	80	83	3	32.5	C	--
	T	137	126	92	12	3.8	A	--
	Subtotal	**233**	**206**	**88**	--	**15.0**	**B**	--
WB	T	250	197	79	12	36.5	D	--
	R	268	206	77	11	4.6	A	--
	Subtotal	**518**	**403**	**78**	--	**20.1**	**C**	--
	Total	**854**	**713**	**83**	--	**16.9**	**B**	--

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5/Richards **HCM:** 2000
Scenario: Existing Conditions **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Richards Blvd & Bercut Dr **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	48	35	73	6	689.3	F	--
	T	4	2	50	1	779.5	F	--
	R	4	3	50	1	527.8	F	--
	Subtotal	**55**	**39**	**71**	--	683.4	F	--
SB	L	11	9	82	4	37.5	D	--
	T	4	4	100	1	37.9	D	--
	R	70	71	101	6	28.6	C	--
	Subtotal	**85**	**84**	99	--	**30.0**	**C**	--
EB	L	53	51	96	8	27.3	C	--
	T	156	146	94	9	7.8	A	--
	R	17	15	88	5	5.7	A	--
	Subtotal	**226**	**212**	94	--	12.3	B	--
WB	L	5	5	100	2	356.1	F	--
	T	400	294	74	12	417.6	F	--
	R	10	7	70	3	385.4	F	--
	Subtotal	**415**	**306**	**74**	--	**415.9**	**F**	--
	Total	**782**	**642**	**82**	--	**248.2**	**F**	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5/Richards **HCM:** 2000
Scenario: Existing Conditions **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: Richards Blvd & I-5 SB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	L	1964	2155	Yes	--	2145	Yes	--
	T	1964	2057	Yes	--	2050	Yes	--
	R	450	475	Yes	--	621	Yes	--
EB	T	200	287	Yes	--	291	Yes	--
	R	200	219	Yes	--	215	Yes	--
WB	L	120	83	--	--	80	--	--
	T	292	137	--	--	135	--	--

Intersection: 2: Richards Blvd & I-5 NB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	982	165	--	--	169	--	--
	R	300	171	--	--	175	--	--
EB	L	120	127	Yes	--	133	Yes	--
	T	292	210	--	--	210	--	--
WB	T	239	260	Yes	--	274	Yes	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5/Richards **HCM:** 2000
Scenario: Existing Conditions **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Richards Blvd & Bercut Dr **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	392	98	--	--	98	--	--
	T	392	98	--	--	98	--	--
	R	150	11	--	--	9	--	--
SB	L	574	77	--	--	72	--	--
	T	574	77	--	--	72	--	--
	R	150	70	--	--	66	--	--
EB	L	150	153	Yes	--	133	--	--
	T	239	251	Yes	--	256	Yes	--
	R	239	250	Yes	--	255	Yes	--
WB	L	150	52	--	--	52	--	--
	T	150	154	Yes	--	150	Yes	--
	R	150	115	--	--	113	--	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5/Richards **HCM:** 2000
Scenario: Existing Conditions **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: Richards Blvd & I-5 SB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	L	1964	263	--	--	253	--	--
	T	1964	263	--	--	253	--	--
	R	450	124	--	--	120	--	--
EB	T	200	917	Yes	--	914	Yes	--
	R	200	225	Yes	--	277	Yes	--
WB	L	120	77	--	--	79	--	--
	T	269	126	--	--	128	--	--

Intersection: 2: Richards Blvd & I-5 NB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	968	124	--	--	123	--	--
	R	300	124	--	--	123	--	--
EB	L	120	122	Yes	--	124	Yes	--
	T	269	65	--	--	62	--	--
	R	269	64	--	--	62	--	--
WB	T	239	309	Yes	--	341	Yes	--
	R	239	233	--	--	224	--	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5/Richards **HCM:** 2000
Scenario: Existing Conditions **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Richards Blvd & Bercut Dr **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	392	422	Yes	--	429	Yes	--
	T	392	422	Yes	--	429	Yes	--
	R	150	158	Yes	--	133	--	--
SB	L	574	247	--	--	184	--	--
	T	574	247	--	--	184	--	--
	R	150	172	Yes	--	187	Yes	--
EB	L	150	151	Yes	--	153	Yes	--
	T	239	172	--	--	177	--	--
	R	239	163	--	--	167	--	--
WB	L	150	121	--	--	103	--	--
	T	150	788	Yes	--	815	Yes	--
	R	150	175	Yes	--	176	Yes	--

SimTraffic Performance Report
I-5/Richards Blvd Interchange

1: Richards Blvd & I-5 SB Ramps Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBR	All
Delay / Veh (s)	32.6	10.4	6.0	8.0	285.9	192.4	112.9
Vehicles Entered	108	19	87	57	126	62	459
Vehicles Exited	108	19	91	57	120	62	457
Hourly Exit Rate	432	76	364	228	480	248	1828
Input Volume	424	77	358	220	725	374	2178
% of Volume	102	99	102	104	66	66	84

2: Richards Blvd & I-5 NB Ramps Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBR	All
Delay / Veh (s)	29.0	16.5	24.3	2.6	26.2	10.6	16.0
Vehicles Entered	50	179	136	73	12	190	640
Vehicles Exited	50	178	132	73	12	189	634
Hourly Exit Rate	200	712	528	292	48	756	2536
Input Volume	199	950	530	291	48	747	2765
% of Volume	101	75	100	100	100	101	92

3: Richards Blvd & Bercut Dr Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	11.7	6.7	6.7	49.8	13.1	13.8	28.8	22.5	10.6	30.5	22.1	8.7
Vehicles Entered	52	275	41	5	156	3	21	5	2	8	5	31
Vehicles Exited	52	276	40	5	157	2	21	5	2	7	5	31
Hourly Exit Rate	208	1104	160	20	628	8	84	20	8	28	20	124
Input Volume	224	1295	178	21	617	11	84	17	8	30	17	120
% of Volume	93	85	90	95	102	73	100	118	100	93	118	103

3: Richards Blvd & Bercut Dr Performance by movement

Movement	All
Delay / Veh (s)	10.6
Vehicles Entered	604
Vehicles Exited	603
Hourly Exit Rate	2412
Input Volume	2622
% of Volume	92

Total Network Performance

Delay / Veh (s)	193.8
Vehicles Entered	754
Vehicles Exited	742
Hourly Exit Rate	2968
Input Volume	11984
% of Volume	25

1: Richards Blvd & I-5 SB Ramps Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBR	All
Delay / Veh (s)	240.6	187.2	6.2	8.8	25.3	7.8	71.3
Vehicles Entered	125	7	126	87	85	66	496
Vehicles Exited	122	7	122	85	84	67	487
Hourly Exit Rate	488	28	488	340	336	268	1948
Input Volume	579	41	646	411	353	265	2295
% of Volume	84	68	76	83	95	101	85

2: Richards Blvd & I-5 NB Ramps Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBR	All
Delay / Veh (s)	32.5	3.8	36.4	4.6	26.2	5.4	16.9
Vehicles Entered	80	126	193	207	16	90	712
Vehicles Exited	80	126	197	206	16	88	713
Hourly Exit Rate	320	504	788	824	64	352	2852
Input Volume	386	549	1001	1071	55	357	3419
% of Volume	83	92	79	77	116	99	83

3: Richards Blvd & Bercut Dr Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	27.4	7.8	5.5	332.7	415.9	401.3	694.7	891.7	624.8	38.9	37.0	28.5
Vehicles Entered	52	146	15	4	296	7	36	3	2	10	4	73
Vehicles Exited	51	146	15	5	294	7	35	2	2	9	4	71
Hourly Exit Rate	204	584	60	20	1176	28	140	8	8	36	16	284
Input Volume	213	626	66	22	1600	39	190	16	14	43	15	282
% of Volume	96	93	91	91	74	72	74	50	57	84	107	101

3: Richards Blvd & Bercut Dr Performance by movement

Movement	All
Delay / Veh (s)	248.6
Vehicles Entered	648
Vehicles Exited	641
Hourly Exit Rate	2564
Input Volume	3126
% of Volume	82

Total Network Performance

Delay / Veh (s)	254.6
Vehicles Entered	825
Vehicles Exited	814
Hourly Exit Rate	3256
Input Volume	13331
% of Volume	24

Appendix B: Design Year (2021) Calculations
No Project and Proposed Project Conditions

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project:	I-5 Richards	**HCM:**	2000
Scenario:	2021 NP	**PHF:**	0.92
TOD:	AM / **Analysis Period:** 15 Minutes	**# of Runs:**	10

Intersection: 1: Richards Blvd & I-5 SB Ramps — **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	L	277	162	58	9	954.5	F	--
	R	155	91	59	11	136.3	F	--
	Subtotal	**432**	**253**	**59**	--	**660.5**	**F**	--
EB	T	125	92	74	7	388.9	F	--
	R	46	35	76	5	79.1	E	--
	Subtotal	**171**	**128**	**75**	--	**303.6**	**F**	--
WB	L	133	90	68	7	10.7	B	--
	T	84	57	68	4	15.0	B	--
	Subtotal	**217**	**147**	**68**	--	**12.4**	**B**	--
	Total	**821**	**527**	**64**	--	**393.6**	**F**	--

Intersection: 2: Richards Blvd & I-5 NB Ramps — **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	27	16	59	2	1027.1	F	--
	R	326	190	58	10	1085.1	F	--
	Subtotal	**353**	**206**	**58**	--	**1080.6**	**F**	--
EB	L	54	41	76	8	50.4	D	--
	T	348	216	62	14	51.1	D	--
	Subtotal	**402**	**257**	**64**	--	**51.0**	**D**	--
WB	T	190	131	69	10	71.0	E	--
	R	174	127	73	13	10.8	B	--
	Subtotal	**364**	**259**	**71**	--	**41.4**	**D**	--
	Total	**1120**	**722**	**64**	--	**341.8**	**F**	--

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: *I-5 Richards* **HCM:** *2000*
Scenario: *2021 NP* **PHF:** *0.92*
TOD: *AM* **Analysis Period:** *15 Minutes* **# of Runs:** *10*

Intersection: *3: Richards Blvd & Bercut Dr* **Type:** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	117	50	43	11	1017.0	F	--
	T	16	7	44	4	1030.3	F	--
	R	24	12	50	6	277.1	F	--
	Subtotal	**158**	**70**	**44**	--	**886.7**	**F**	--
SB	L	14	13	93	4	50.0	D	--
	T	16	17	106	5	53.9	D	--
	R	38	36	95	6	29.0	C	--
	Subtotal	**68**	**66**	**97**	--	**39.5**	**D**	--
EB	L	71	41	58	5	41.2	D	--
	T	429	257	60	17	22.0	C	--
	R	174	105	60	13	20.0	B	--
	Subtotal	**674**	**403**	**60**	--	**23.5**	**C**	--
WB	L	19	15	79	3	353.2	F	--
	T	209	172	82	19	143.8	F	--
	R	16	14	88	4	110.5	F	--
	Subtotal	**245**	**202**	**82**	--	**157.1**	**F**	--
	Total	**1144**	**740**	**65**	--	**142.6**	**F**	--

Intersection: *13: I-5 NB Ramps &* **Type:** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	228	169	74	4	76.6	E	--
	Subtotal	**228**	**169**	**74**	--	**76.6**	**E**	--
	Total	**228**	**169**	**74**	--	**76.6**	**E**	--

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards
Scenario: 2021 NP
TOD: AM
Analysis Period: 15 Minutes
HCM: 2000
PHF: 0.92
# of Runs: 10

Intersection: 16: I-5 SB Ramps &
Type: Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	T	179	126	70	9	24.8	C	--
	Subtotal	179	126	70	--	24.8	C	--
	Total	179	126	70	--	24.8	C	--

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: *I-5 Richards* **HCM:** *2000*
Scenario: *2021 NP* **PHF:** *0.92*
TOD: *PM* **Analysis Period:** *15 Minutes* **# of Runs:** *10*

Intersection: *1: Richards Blvd & I-5 SB Ramps* **Type:** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	L	220	161	73	4	471.6	F	--
	R	122	100	82	7	139.1	F	--
	Subtotal	**342**	**261**	**76**	--	**344.4**	F	--
EB	T	179	118	66	4	608.4	F	--
	R	68	45	66	8	48.2	D	--
	Subtotal	**247**	**164**	**66**	--	**453.1**	F	--
WB	L	215	122	57	7	8.3	A	--
	T	149	80	54	8	14.5	B	--
	Subtotal	**364**	**203**	**55**	--	**10.7**	B	--
	Total	**954**	**628**	**66**	--	**265.1**	F	--

Intersection: *2: Richards Blvd & I-5 NB Ramps* **Type:** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	30	16	53	4	972.2	F	--
	R	296	174	59	9	1000.2	F	--
	Subtotal	**326**	**191**	**59**	--	**997.8**	F	--
EB	L	111	73	66	3	11.4	B	--
	T	288	209	73	7	7.5	A	--
	Subtotal	**399**	**282**	**71**	--	**8.5**	A	--
WB	T	334	184	55	9	36.6	D	--
	R	378	207	55	6	4.9	A	--
	Subtotal	712	**391**	**55**	--	**19.8**	B	--
	Total	**1438**	**863**	**60**	--	**232.2**	F	--

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 NP **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Richards Blvd & Bercut Dr **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	185	53	29	10	3035.8	F	--
	T	22	6	27	2	3072.5	F	--
	R	14	4	29	3	316.4	F	--
	Subtotal	**220**	**63**	**29**	--	**2857.3**	**F**	--
SB	L	27	25	93	6	41.2	D	--
	T	22	22	100	6	40.2	D	--
	R	82	77	94	9	36.8	D	--
	Subtotal	**130**	**124**	**95**	--	**38.3**	**D**	--
EB	L	60	42	70	3	57.2	E	--
	T	345	224	65	10	19.4	B	--
	R	179	120	67	5	20.3	C	--
	Subtotal	**584**	**386**	**66**	--	**23.8**	**C**	--
WB	L	22	14	64	2	674.8	F	--
	T	446	260	58	10	701.0	F	--
	R	19	11	58	2	684.0	F	--
	Subtotal	**486**	**285**	**59**	--	**699.0**	**F**	--
	Total	**1421**	**858**	**60**	--	**457.4**	**F**	--

Intersection: 13: I-5 NB Ramps & **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	489	277	57	9	9.3	A	--
	Subtotal	**489**	**277**	**57**	--	**9.3**	**A**	--
	Total	**489**	**277**	**57**	--	**9.3**	**A**	--

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 NP **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 16: I-5 SB Ramps & **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	T	283	167	59	12	16.7	B	--
	Subtotal	283	167	59	--	16.7	B	--
	Total	283	167	59	--	16.7	B	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 NP **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: Richards Blvd & I-5 SB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	L	1982	5429	Yes	--	5497	Yes	--
	T	1982	2058	Yes	--	2126	Yes	--
	R	350	375	Yes	--	488	Yes	--
EB	T	200	2456	Yes	--	2398	Yes	--
	R	200	225	Yes	--	230	Yes	--
WB	L	120	125	Yes	--	124	Yes	--
	T	317	202	--	--	199	--	--

Intersection: 2: Richards Blvd & I-5 NB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	5547	5573	Yes	--	5570	Yes	--
	R	300	5573	Yes	--	5570	Yes	--
EB	L	120	144	Yes	--	173	Yes	--
	T	317	356	Yes	--	360	Yes	--
WB	T	252	315	Yes	--	348	Yes	--
	R	252	286	Yes	--	315	Yes	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 NP **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Richards Blvd & Bercut Dr **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	678	4305	Yes	--	4257	Yes	--
	T	678	4305	Yes	--	4257	Yes	--
	R	150	175	Yes	--	199	Yes	--
SB	L	5222	166	--	--	162	--	--
	T	5222	166	--	--	162	--	--
	R	150	149	--	--	146	--	--
EB	L	150	171	Yes	--	178	Yes	--
	T	252	290	Yes	--	283	Yes	--
	R	252	276	Yes	--	274	Yes	--
WB	L	150	173	Yes	--	191	Yes	--
	T	150	1004	Yes	--	895	Yes	--
	R	150	175	Yes	--	205	Yes	--

Intersection: 13: I-5 NB Ramps & **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	T	379	391	Yes	--	416	Yes	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 NP **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 16: I-5 SB Ramps & **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	T	314	192	--	--	188	--	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 NP **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: Richards Blvd & I-5 SB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	L	1982	5429	Yes	--	5680	Yes	--
	T	1982	2058	Yes	--	2058	Yes	--
	R	350	375	Yes	--	457	Yes	--
EB	T	200	5687	Yes	--	5965	Yes	--
	R	200	225	Yes	--	250	Yes	--
WB	L	120	171	Yes	--	154	Yes	--
	T	317	286	--	--	279	--	--

Intersection: 2: Richards Blvd & I-5 NB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	5547	5575	Yes	--	5663	Yes	--
	R	300	5575	Yes	--	5663	Yes	--
EB	L	120	119	--	--	127	Yes	--
	T	317	202	--	--	197	--	--
WB	T	252	300	Yes	--	320	Yes	--
	R	252	151	--	--	128	--	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 NP **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Richards Blvd & Bercut Dr **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	678	5372	Yes	--	5476	Yes	--
	T	678	5372	Yes	--	5476	Yes	--
	R	150	156	Yes	--	141	--	--
SB	L	5222	268	--	--	249	--	--
	T	5222	268	--	--	249	--	--
	R	150	174	Yes	--	197	Yes	--
EB	L	150	174	Yes	--	205	Yes	--
	T	252	320	Yes	--	333	Yes	--
	R	252	290	Yes	--	292	Yes	--
WB	L	150	175	Yes	--	208	Yes	--
	T	150	7331	Yes	--	7066	Yes	--
	R	150	175	Yes	--	176	Yes	--

Intersection: 13: I-5 NB Ramps & **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	T	379	212	--	--	209	--	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 NP **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 16: I-5 SB Ramps & **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	T	314	197	--	--	201	--	--

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards
Scenario: 2021 PP
TOD: AM
Analysis Period: 15 Minutes
HCM: 2000
PHF: 0.92
# of Runs: 10

Intersection: 1: Richards Blvd & I-5 SB Ramps
Type: Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	L	277	254	92	15	152.2	F	--
	R	155	144	93	9	52.3	D	--
	Subtotal	432	398	92	--	116.0	F	--
EB	T	125	68	54	21	398.2	F	--
	R	46	27	59	11	23.8	C	--
	Subtotal	171	95	56	--	290.7	F	--
WB	L	133	125	94	6	75.2	E	--
	T	84	66	79	8	23.9	C	--
	Subtotal	217	192	88	--	57.4	E	--
	Total	821	684	83	--	123.9	F	--

Intersection: 2: Richards Blvd & I-5 NB Ramps
Type: Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	27	15	56	4	922.6	F	--
	R	326	202	62	5	914.3	F	--
	Subtotal	353	217	61	--	914.9	F	--
EB	L	54	24	44	8	405.2	F	--
	T	348	297	85	12	31.2	C	--
	Subtotal	402	321	80	--	59.3	E	--
WB	T	190	174	92	14	35.1	D	--
	R	174	150	86	7	17.1	B	--
	Subtotal	364	324	89	--	26.8	C	--
	Total	1120	861	77	--	262.2	F	--

1: Richards Blvd & I-5 SB Ramps Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBR	All
Delay / Veh (s)	132.4	78.4	10.8	15.0	176.4	136.0	109.5
Travel Dist (mi)	6.3	2.0	6.5	4.2	63.1	35.9	118.1
Travel Time (hr)	3.7	0.9	0.5	0.4	10.2	4.8	20.5
Avg Speed (mph)	2	2	12	11	6	7	6
Vehicles Exited	92	35	90	57	162	91	527
Hourly Exit Rate	368	140	360	228	648	364	2108
Input Volume	500	185	533	338	1109	620	3285
% of Volume	74	76	68	67	58	59	64
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

2: Richards Blvd & I-5 NB Ramps Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBR	All
Delay / Veh (s)	50.2	51.0	70.9	10.8	1030.1	1087.3	339.1
Travel Dist (mi)	3.1	16.1	8.4	6.6	16.4	197.1	247.7
Travel Time (hr)	0.7	3.7	2.9	0.7	5.1	63.1	76.2
Avg Speed (mph)	4	4	3	10	5	5	5
Vehicles Exited	41	216	131	127	16	190	721
Hourly Exit Rate	164	864	524	508	64	760	2884
Input Volume	217	1392	761	696	109	1304	4479
% of Volume	76	62	69	73	59	58	64
Denied Entry Before	0	0	0	0	1	14	15
Denied Entry After	0	0	0	0	11	152	163

3: Richards Blvd & Bercut Dr Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	40.9	22.0	20.0	358.8	148.5	109.6	365.0	359.5	281.5	48.9	54.6	29.4
Travel Dist (mi)	2.5	15.1	6.0	38.2	412.1	34.1	7.0	1.1	1.7	13.5	17.6	36.5
Travel Time (hr)	0.6	2.2	0.9	3.0	21.9	1.6	5.4	0.8	1.0	0.7	0.9	1.6
Avg Speed (mph)	4	7	7	13	19	21	1	1	2	20	20	23
Vehicles Exited	41	257	105	15	172	14	50	7	12	13	17	36
Hourly Exit Rate	164	1028	420	60	688	56	200	28	48	52	68	144
Input Volume	283	1717	696	76	837	65	467	65	98	54	65	152
% of Volume	58	60	60	79	82	86	43	43	49	96	105	95
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

3: Richards Blvd & Bercut Dr Performance by movement

Movement	All
Delay / Veh (s)	95.7
Travel Dist (mi)	585.4
Travel Time (hr)	40.7
Avg Speed (mph)	14
Vehicles Exited	739
Hourly Exit Rate	2956
Input Volume	4575
% of Volume	65
Denied Entry Before	0
Denied Entry After	0

4: External Performance by approach

Approach	SB	All
Delay / Veh (s)	38.6	38.6
Travel Dist (mi)	151.4	151.4
Travel Time (hr)	9.3	9.3
Avg Speed (mph)	16	16
Vehicles Exited	149	149
Hourly Exit Rate	596	596
Input Volume	957	957
% of Volume	62	62
Denied Entry Before	0	0
Denied Entry After	0	0

1: Richards Blvd & I-5 SB Ramps Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBR	All
Delay / Veh (s)	87.0	48.6	8.3	14.4	168.0	138.7	88.9
Travel Dist (mi)	8.2	2.6	8.8	5.8	61.9	38.8	126.1
Travel Time (hr)	3.3	0.7	0.6	0.5	9.6	5.2	20.1
Avg Speed (mph)	2	4	14	11	6	7	6
Vehicles Exited	118	45	122	80	161	100	626
Hourly Exit Rate	472	180	488	320	644	400	2504
Input Volume	717	272	859	598	880	489	3815
% of Volume	66	66	57	54	73	82	66
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

2: Richards Blvd & I-5 NB Ramps Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBR	All
Delay / Veh (s)	11.4	7.5	36.6	4.9	991.1	995.8	236.7
Travel Dist (mi)	5.4	15.6	11.7	10.6	17.2	182.3	242.7
Travel Time (hr)	0.5	1.1	2.3	0.7	5.3	55.9	65.8
Avg Speed (mph)	12	14	5	15	4	4	5
Vehicles Exited	73	209	184	207	16	174	863
Hourly Exit Rate	292	836	736	828	64	696	3452
Input Volume	446	1152	1338	1511	120	1185	5752
% of Volume	65	73	55	55	53	59	60
Denied Entry Before	0	0	0	0	0	3	3
Denied Entry After	0	0	0	0	13	122	135

3: Richards Blvd & Bercut Dr Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	57.1	19.4	20.3	686.1	702.5	675.7	402.2	430.2	342.1	40.8	40.4	36.7
Travel Dist (mi)	2.5	13.1	6.8	34.7	725.8	34.3	7.6	0.9	0.6	24.8	22.0	76.4
Travel Time (hr)	0.8	1.8	1.0	4.4	93.8	4.2	6.2	0.7	0.4	1.1	1.0	3.5
Avg Speed (mph)	3	7	7	8	8	8	1	1	2	22	22	22
Vehicles Exited	42	224	120	14	260	11	53	6	4	25	22	77
Hourly Exit Rate	168	896	480	56	1040	44	212	24	16	100	88	308
Input Volume	239	1381	717	87	1783	76	739	87	54	109	87	326
% of Volume	70	65	67	64	58	58	29	28	30	92	101	94
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	1	0	0	0	0	0	0	0

3: Richards Blvd & Bercut Dr Performance by movement

Movement	All
Delay / Veh (s)	322.5
Travel Dist (mi)	949.4
Travel Time (hr)	118.9
Avg Speed (mph)	8
Vehicles Exited	858
Hourly Exit Rate	3432
Input Volume	5685
% of Volume	60
Denied Entry Before	0
Denied Entry After	1

4: External Performance by approach

Approach	SB	All
Delay / Veh (s)	42.8	42.8
Travel Dist (mi)	181.6	181.6
Travel Time (hr)	11.4	11.4
Avg Speed (mph)	16	16
Vehicles Exited	179	179
Hourly Exit Rate	716	716
Input Volume	1087	1087
% of Volume	66	66
Denied Entry Before	0	0
Denied Entry After	0	0

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 PP - New Pref Alt **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: Richards Blvd & I-5 SB Ramps **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	L	277	256	92	6	113.4	F	--
	R	155	142	92	8	43.2	D	--
	Subtotal	**432**	**397**	**92**	--	**88.4**	**F**	--
EB	T	125	41	32	15	736.1	F	--
	R	46	18	39	9	13.1	B	--
	Subtotal	**171**	**59**	**35**	--	**511.9**	**F**	--
WB	L	133	119	89	10	39.2	D	--
	T	84	66	79	11	24.9	C	--
	Subtotal	**217**	**185**	**85**	--	**34.1**	**C**	--
	Total	**821**	**641**	**78**	--	**111.6**	**F**	--

Intersection: 2: Richards Blvd & I-5 NB Ramps **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	27	18	67	6	632.7	F	--
	R	326	218	67	15	697.9	F	--
	Subtotal	**353**	**236**	**67**	--	**692.8**	**F**	--
EB	L	54	14	26	5	764.2	F	--
	T	348	283	81	10	19.6	B	--
	Subtotal	**402**	**296**	**74**	--	**54.6**	**D**	--
WB	T	190	164	86	20	37.6	D	--
	R	174	133	76	4	32.0	C	--
	Subtotal	**364**	**297**	**82**	--	**35.1**	**D**	--
	Total	**1120**	**829**	**74**	--	**229.3**	**F**	--

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SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 PP - New Pref Alt **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Richards Blvd & Bercut Dr **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	117	109	93	11	82.2	F	--
	T	16	16	100	3	54.2	D	--
	R	24	26	108	5	24.3	C	--
	Subtotal	**158**	**151**	**96**	--	**69.3**	**E**	--
SB	L	14	13	93	2	96.7	F	--
	T	16	16	100	4	102.6	F	--
	R	38	33	87	5	39.6	D	--
	Subtotal	**68**	**63**	**93**	--	**68.0**	**E**	--
EB	L	71	53	75	5	30.5	C	--
	T	429	317	74	8	21.1	C	--
	R	174	129	74	11	6.4	A	--
	Subtotal	**674**	**500**	**74**	--	**18.3**	**B**	--
WB	L	19	17	84	3	320.7	F	--
	T	209	156	75	18	182.4	F	--
	R	16	12	75	4	187.1	F	--
	Subtotal	**245**	**184**	**75**	--	**195.1**	**F**	--
	Total	**1144**	**898**	**78**	--	**66.6**	**E**	--

Intersection: 13: I-5 NB Ramps & **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	228	147	64	7	168.0	F	--
	Subtotal	**228**	**147**	**64**	--	**168.0**	**F**	--
	Total	**228**	**147**	**64**	--	**168.0**	**F**	--

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 PP - New Pref Alt **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 16: I-5 SB Ramps & **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	T	179	146	82	17	42.5	D	--
	Subtotal	**179**	**146**	**82**	**--**	**42.5**	**D**	**--**
	Total	**179**	**146**	**82**	**--**	**42.5**	**D**	**--**

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SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 New Pref Alt **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: Richards Blvd & I-5 SB Ramps **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served Avg	Volume Served %	Volume Served Std Dev	Delay/Veh (sec) Avg	Delay/Veh (sec) LOS	Delay/Veh (sec) Std Dev
SB	L	220	210	95	7	91.8	F	--
	R	122	112	92	10	57.3	E	--
	Subtotal	**342**	**321**	**94**	--	**79.8**	**E**	--
EB	T	179	105	59	11	752.8	F	--
	R	68	42	62	10	9.4	A	--
	Subtotal	**247**	**147**	**60**	--	**540.9**	**F**	--
WB	L	215	163	76	16	24.9	C	--
	T	149	119	80	7	29.5	C	--
	Subtotal	**364**	**282**	**77**	--	**26.8**	**C**	--
	Total	**954**	**750**	**79**	--	**150.3**	**F**	--

Intersection: 2: Richards Blvd & I-5 NB Ramps **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served Avg	Volume Served %	Volume Served Std Dev	Delay/Veh (sec) Avg	Delay/Veh (sec) LOS	Delay/Veh (sec) Std Dev
NB	L	30	25	83	5	254.4	F	--
	R	296	236	80	16	285.2	F	--
	Subtotal	**326**	**261**	**80**	--	**282.3**	**F**	--
EB	L	111	69	61	5	121.5	F	--
	T	288	238	83	9	27.4	C	--
	Subtotal	**399**	**307**	**77**	--	**48.4**	**D**	--
WB	T	334	243	73	12	24.1	C	--
	R	378	287	76	13	6.3	A	--
	Subtotal	**712**	**530**	**74**	--	**14.5**	**B**	--
	Total	**1438**	**1098**	**76**	--	**87.6**	**F**	--

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 New Pref Alt **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Richards Blvd & Bercut Dr **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	185	164	89	10	247.5	F	--
	T	22	21	95	3	157.7	F	--
	R	14	12	86	4	37.2	D	--
	Subtotal	**220**	**196**	**89**	--	**225.6**	**F**	--
SB	L	27	23	85	5	195.6	F	--
	T	22	20	91	5	192.4	F	--
	R	82	73	89	9	162.4	F	--
	Subtotal	**130**	**117**	**90**	--	**174.2**	**F**	--
EB	L	60	49	80	4	81.7	F	--
	T	345	280	81	9	23.4	C	--
	R	179	147	82	13	3.8	A	--
	Subtotal	**584**	**475**	**81**	--	**23.3**	**C**	--
WB	L	22	15	68	3	401.6	F	--
	T	446	303	68	8	400.4	F	--
	R	19	14	74	3	397.9	F	--
	Subtotal	**486**	**333**	**68**	--	**400.4**	**F**	--
	Total	**1421**	**1121**	**79**	--	**186.3**	**F**	--

Intersection: 13: I-5 NB Ramps & **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	489	355	73	10	28.6	C	--
	Subtotal	**489**	**355**	**73**	--	**28.6**	**C**	--
	Total	**489**	**355**	**73**	--	**28.6**	**C**	--

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 New Pref Alt **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 16: I-5 SB Ramps & **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	T	283	211	75	14	18.4	B	--
	Subtotal	**283**	**211**	**75**	**--**	**18.4**	**B**	**--**
	Total	**283**	**211**	**75**	**--**	**18.4**	**B**	**--**

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 PP - New Pref Alt **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: Richards Blvd & I-5 SB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	L	300	2884	Yes	--	2303	Yes	--
	R	150	175	Yes	--	190	Yes	--
EB	T	200	3838	Yes	--	3714	Yes	--
	R	200	110	--	--	108	--	--
WB	L	288	279	--	--	283	--	--
	T	288	361	Yes	--	381	Yes	--

Intersection: 2: Richards Blvd & I-5 NB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	400	355	--	--	309	--	--
	T	5530	5552	Yes	--	5743	Yes	--
	R	400	5552	Yes	--	5743	Yes	--
EB	L	288	310	Yes	--	310	Yes	--
	T	288	217	--	--	216	--	--
WB	T	243	279	Yes	--	302	Yes	--
	R	243	282	Yes	--	300	Yes	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 PP - New Pref Alt **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Richards Blvd & Bercut Dr **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	200	475	Yes	--	450	Yes	--
	T	677	158	--	--	158	--	--
	R	677	158	--	--	158	--	--
SB	L	5220	229	--	--	232	--	--
	T	5220	229	--	--	232	--	--
	R	150	168	Yes	--	184	Yes	--
EB	L	200	225	Yes	--	260	Yes	--
	T	243	316	Yes	--	334	Yes	--
	R	243	300	Yes	--	340	Yes	--
WB	L	250	245	--	--	256	Yes	--
	T	500	1004	Yes	--	913	Yes	--
	R	500	505	Yes	--	556	Yes	--

Intersection: 13: I-5 NB Ramps & **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	T	358	483	Yes	--	482	Yes	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 PP - New Pref Alt **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 16: I-5 SB Ramps & **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	T	280	251	--	--	265	--	--

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TRANSPORTATION CONSULTANTS

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 New Pref Alt **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: Richards Blvd & I-5 SB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	L	300	1908	Yes	--	1610	Yes	--
	R	150	175	Yes	--	196	Yes	--
EB	T	200	5681	Yes	--	6214	Yes	--
	R	200	166	--	--	145	--	--
WB	L	288	200	--	--	199	--	--
	T	288	334	Yes	--	367	Yes	--

Intersection: 2: Richards Blvd & I-5 NB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	400	337	--	--	301	--	--
	T	5530	4982	--	--	5114	--	--
	R	400	4982	Yes	--	5114	Yes	--
EB	L	288	318	Yes	--	319	Yes	--
	T	288	256	--	--	251	--	--
WB	T	243	281	Yes	--	293	Yes	--
	R	243	278	Yes	--	304	Yes	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 New Pref Alt **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Richards Blvd & Bercut Dr **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	200	2744	Yes	--	2718	Yes	--
	T	677	2249	Yes	--	2210	Yes	--
	R	677	233	--	--	233	--	--
SB	L	5220	954	--	--	974	--	--
	T	5220	954	--	--	974	--	--
	R	150	175	Yes	--	183	Yes	--
EB	L	200	225	Yes	--	265	Yes	--
	T	243	294	Yes	--	294	Yes	--
	R	243	297	Yes	--	357	Yes	--
WB	L	250	273	Yes	--	333	Yes	--
	T	500	4209	Yes	--	4174	Yes	--
	R	500	525	Yes	--	542	Yes	--

Intersection: 13: I-5 NB Ramps & **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	T	358	426	Yes	--	441	Yes	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 New Pref Alt **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 16: I-5 SB Ramps & **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	T	280	207	--	--	210	--	--

FEHR & PEERS
TRANSPORTATION CONSULTANTS

1: Richards Blvd & I-5 SB Ramps Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBR	All
Delay / Veh (s)	235.4	14.2	32.6	22.9	66.3	57.7	63.2
Vehicles Exited	43	22	129	77	269	127	667
Hourly Exit Rate	172	88	516	308	1076	508	2668
Input Volume	500	185	533	338	1109	620	3285
% of Volume	34	48	97	91	97	82	81

2: Richards Blvd & I-5 NB Ramps Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBR	All
Delay / Veh (s)	647.6	20.9	32.6	21.7	738.3	780.8	237.2
Vehicles Exited	17	298	189	137	18	207	866
Hourly Exit Rate	68	1192	756	548	72	828	3464
Input Volume	217	1392	761	696	109	1304	4479
% of Volume	31	86	99	79	66	63	77

3: Richards Blvd & Bercut Dr Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	30.6	25.5	7.3	345.1	166.9	180.1	77.5	16.7	11.4	79.9	76.7	40.3
Vehicles Exited	55	306	149	19	166	16	125	17	20	11	21	42
Hourly Exit Rate	220	1224	596	76	664	64	500	68	80	44	84	168
Input Volume	283	1717	696	76	837	65	467	65	98	54	65	152
% of Volume	78	71	86	100	79	98	107	105	82	81	129	111

3: Richards Blvd & Bercut Dr Performance by movement

Movement	All
Delay / Veh (s)	68.6
Vehicles Exited	947
Hourly Exit Rate	3788
Input Volume	4575
% of Volume	83

13: I-5 NB Ramps & Performance by movement

Movement	NBT	All
Delay / Veh (s)	153.7	153.7
Vehicles Exited	156	156
Hourly Exit Rate	624	624
Input Volume	913	913
% of Volume	68	68

16: I-5 SB Ramps & Performance by movement

Movement	SBT	All
Delay / Veh (s)	44.3	44.3
Vehicles Exited	157	157
Hourly Exit Rate	628	628
Input Volume	718	718
% of Volume	87	87

Total Network Performance

Delay / Veh (s)	390.8
Vehicles Exited	1149
Hourly Exit Rate	4596
Input Volume	26144
% of Volume	18

1: Richards Blvd & I-5 SB Ramps Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBR	All
Delay / Veh (s)	113.6	9.3	24.9	29.5	68.7	57.6	54.5
Vehicles Exited	105	42	163	119	210	112	751
Hourly Exit Rate	420	168	652	476	840	448	3004
Input Volume	717	272	859	598	880	489	3815
% of Volume	59	62	76	80	95	92	79

2: Richards Blvd & I-5 NB Ramps Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBR	All
Delay / Veh (s)	122.4	27.4	24.1	6.4	255.2	285.6	92.3
Vehicles Exited	68	238	243	287	25	236	1097
Hourly Exit Rate	272	952	972	1148	100	944	4388
Input Volume	446	1152	1338	1511	120	1185	5752
% of Volume	61	83	73	76	83	80	76

3: Richards Blvd & Bercut Dr Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	81.8	23.4	3.8	413.2	400.6	395.7	132.4	41.6	35.9	202.7	195.7	164.3
Vehicles Exited	48	280	147	15	303	14	164	21	12	23	20	73
Hourly Exit Rate	192	1120	588	60	1212	56	656	84	48	92	80	292
Input Volume	239	1381	717	87	1783	76	739	87	54	109	87	326
% of Volume	80	81	82	69	68	74	89	97	89	84	92	90

3: Richards Blvd & Bercut Dr Performance by movement

Movement	All
Delay / Veh (s)	182.9
Vehicles Exited	1120
Hourly Exit Rate	4480
Input Volume	5685
% of Volume	79

4: External Performance by approach

Approach	SB	All
Delay / Veh (s)	44.5	44.5
Vehicles Exited	228	228
Hourly Exit Rate	912	912
Input Volume	1087	1087
% of Volume	84	84

Leisch Method for Weaving Analysis

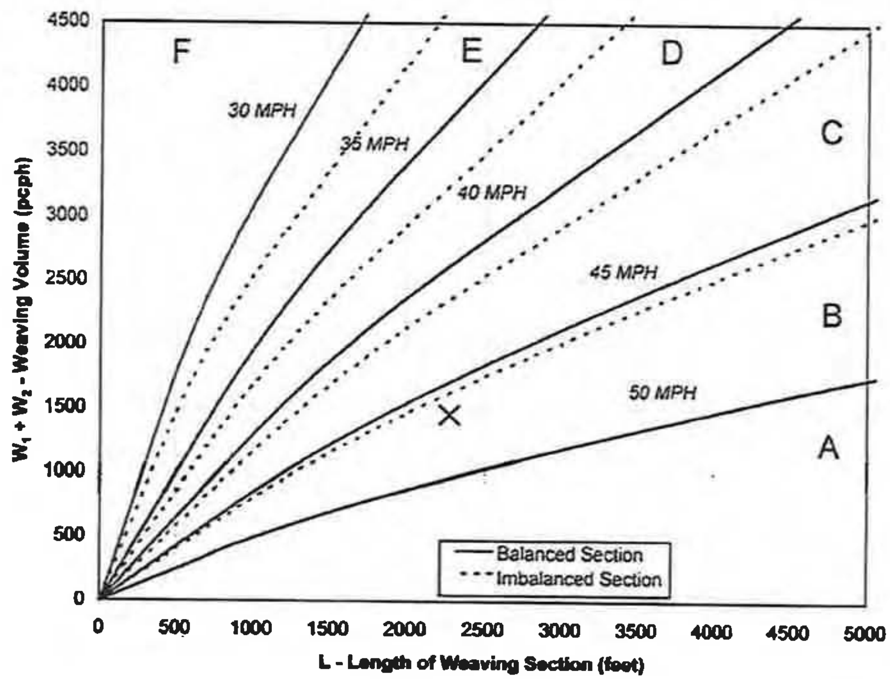
Data Input

Number of Entering Mainline Lanes	N_b	4
Number of Lanes in Weaving Section	N	5
Length of Weaving Section (feet)	L	2,275

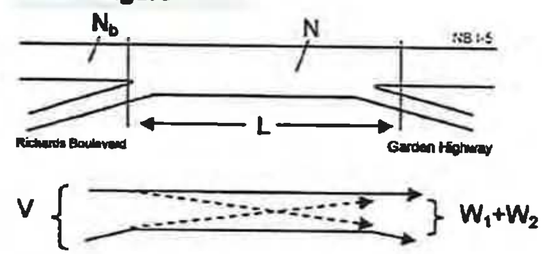
Project Information

Project	I-5 Richards Blvd Interchange
Scenario	2021 NP AM Conditions
Freeway	NB I-5
On-ramp	Richards Boulevard
Off-ramp	Garden Highway

Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	7,710	Volume (vph)*	622	Volume (vph)*	824
Truck Percentage	10%	Truck Percentage	2%	Truck Percentage	2%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	8,096	Volume (pcph)	628	Volume (pcph)	832



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **N**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   45 MPH and **50 MPH**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **46.3**
4. Weaving Intensity Factor (k) **1.78**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*min(W_1, W_2)]$ **1,717**
6. Level of Service (LOS) **E**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

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7/21/2008

Leisch Method for Weaving Analysis

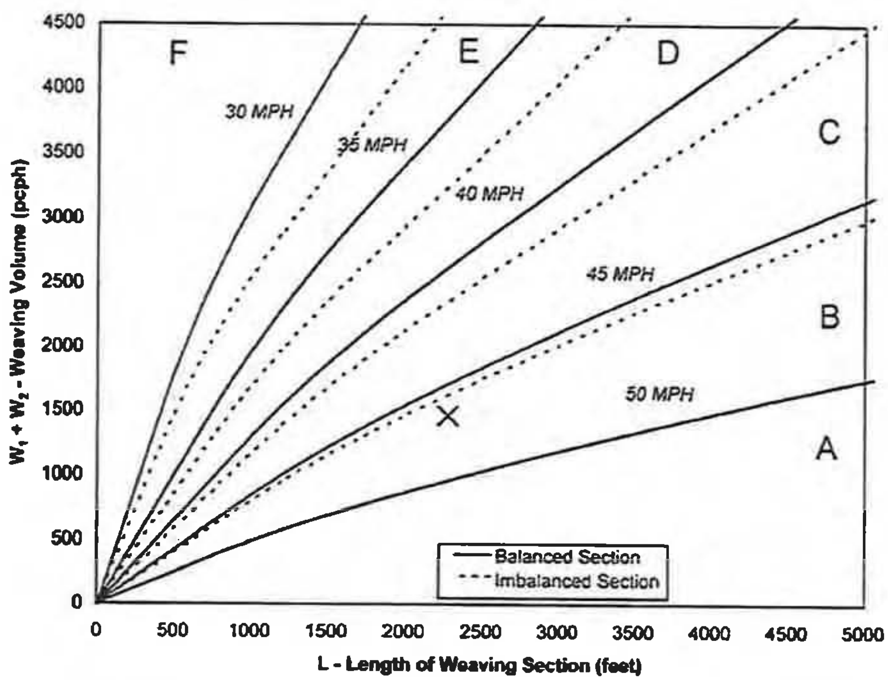
Data Input

Number of Entering Mainline Lanes	N_b	4
Number of Lanes in Weaving Section	N	5
Length of Weaving Section (feet)	L	2,275

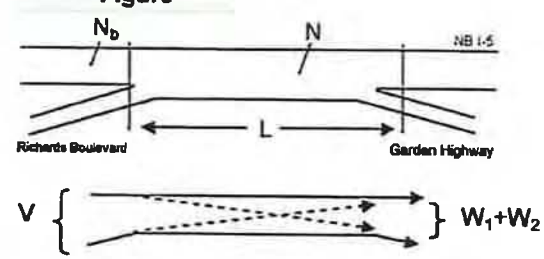
Project Information

Project	I-5 Richards Blvd Interchange
Scenario	2021 PP AM Conditions
Freeway	NB I-5
On-ramp	Richards Boulevard
Off-ramp	Garden Highway

Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	7,710	Volume (vph)*	630	Volume (vph)*	824
Truck Percentage	10%	Truck Percentage	2%	Truck Percentage	2%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	8,096	Volume (pcph)	636	Volume (pcph)	832



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **N**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   45 MPH and **50 MPH**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **46.2**
4. Weaving Intensity Factor (k) **1.80**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*min(W_1, W_2)]$ **1,721**
6. Level of Service (LOS) **E**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: Do not adjust by a Peak Hour Factor (PHF). The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

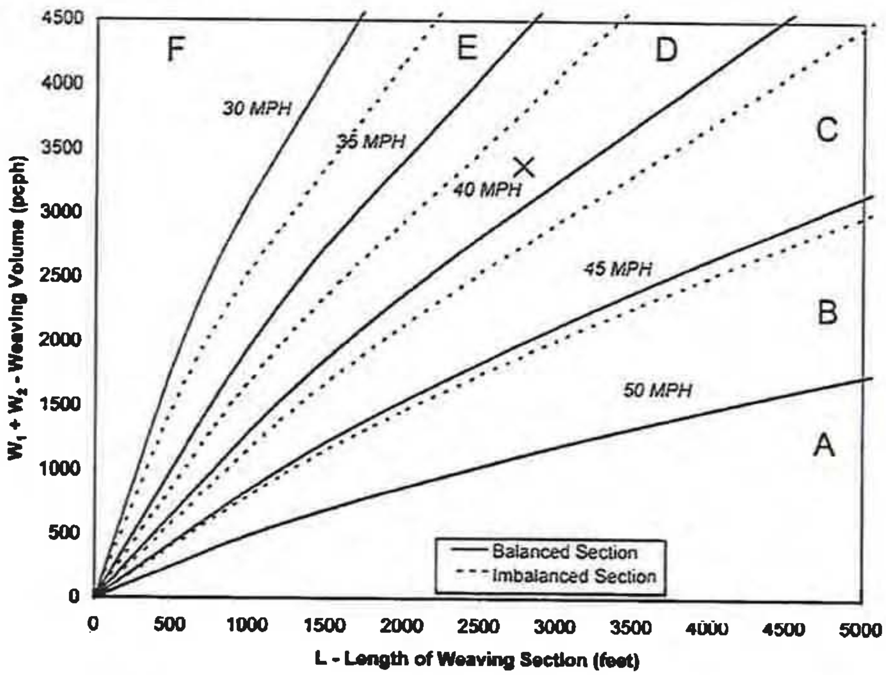
Data Input

Number of Entering Mainline Lanes	N_b	4
Number of Lanes in Weaving Section	N	5
Length of Weaving Section (feet)	L	2,775

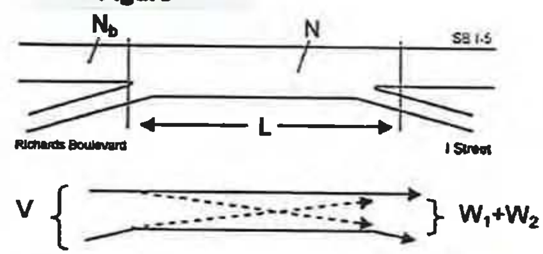
Project Information

Project	I-5 Richards Blvd Interchange
Scenario	2021 NP AM Conditions
Freeway	SB I-5
On-ramp	Richards Boulevard
Off-ramp	I Street

Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	9,062	Volume (vph)*	462	Volume (vph)*	2,888
Truck Percentage	10%	Truck Percentage	2%	Truck Percentage	2%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	9,515	Volume (pcph)	467	Volume (pcph)	2,917



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **Y**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   35 MPH and **40 MPH**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **38.8**
4. Weaving Intensity Factor (k) **3.00**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **2,090**
6. Level of Service (LOS) **F**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF)**. The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

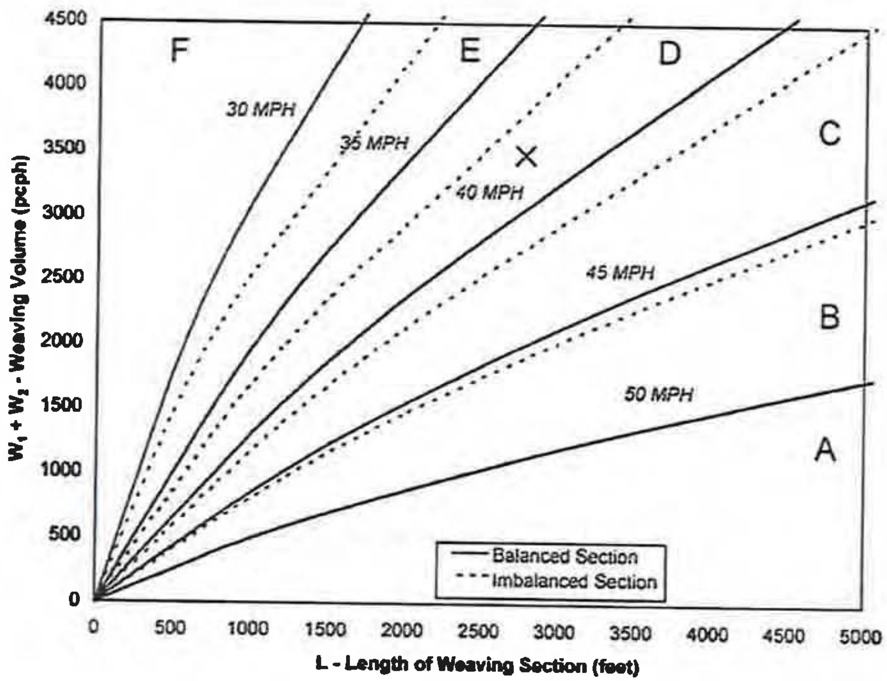
Data Input

Number of Entering Mainline Lanes	N_b	4
Number of Lanes in Weaving Section	N	5
Length of Weaving Section (feet)	L	2,775

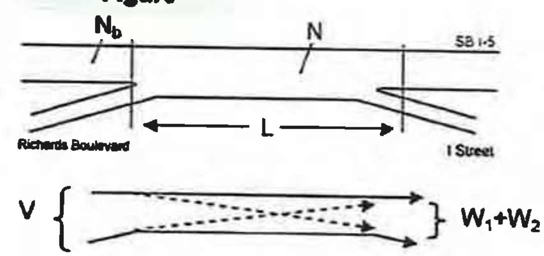
Project Information

Project	I-5 Richards Blvd Interchange
Scenario	2021 PP AM Conditions
Freeway	SB I-5
On-ramp	Richards Boulevard
Off-ramp	I Street

Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	9,010	Volume (vph)*	561	Volume (vph)*	2,888
Truck Percentage	10%	Truck Percentage	2%	Truck Percentage	2%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	9,461	Volume (pcph)	567	Volume (pcph)	2,917



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **Y**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   35 MPH and **40 MPH**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **38.5**
4. Weaving Intensity Factor (k) **3.00**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **2,119**
6. Level of Service (LOS) **F**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: Do not adjust by a Peak Hour Factor (PHF). The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

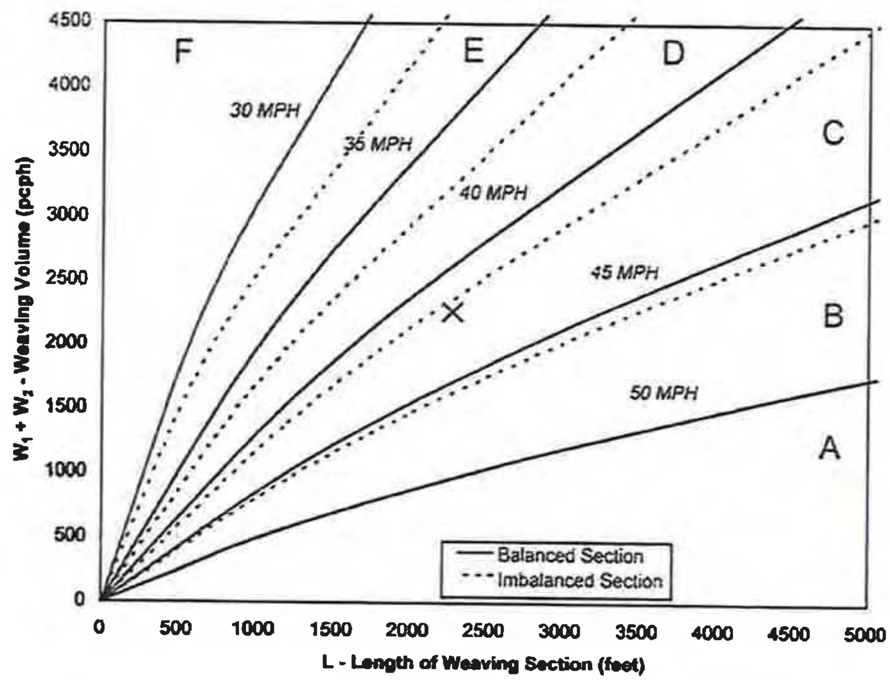
Data Input

Number of Entering Mainline Lanes	N_b	4
Number of Lanes in Weaving Section	N	5
Length of Weaving Section (feet)	L	2,275

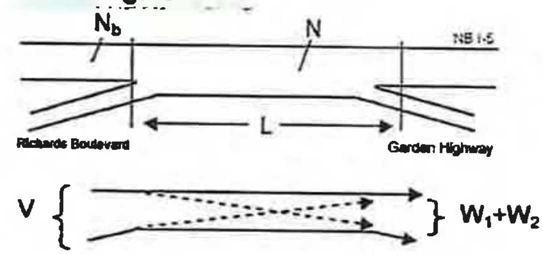
Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	11,140	Volume (vph)*	1,026	Volume (vph)*	1,217
Truck Percentage	10%	Truck Percentage	2%	Truck Percentage	2%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	11,697	Volume (pcph)	1,036	Volume (pcph)	1,229

Project Information

Project	I-5 Richards Blvd Interchange
Scenario	2021 NP PM Conditions
Freeway	NB I-5
On-ramp	Richards Boulevard
Off-ramp	Garden Highway



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **N**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   40 MPH and **45 MPH**

   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **40.7**
4. Weaving Intensity Factor (k) **2.47**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*min(W_1, W_2)]$ **2,644**
6. Level of Service (LOS) **F**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

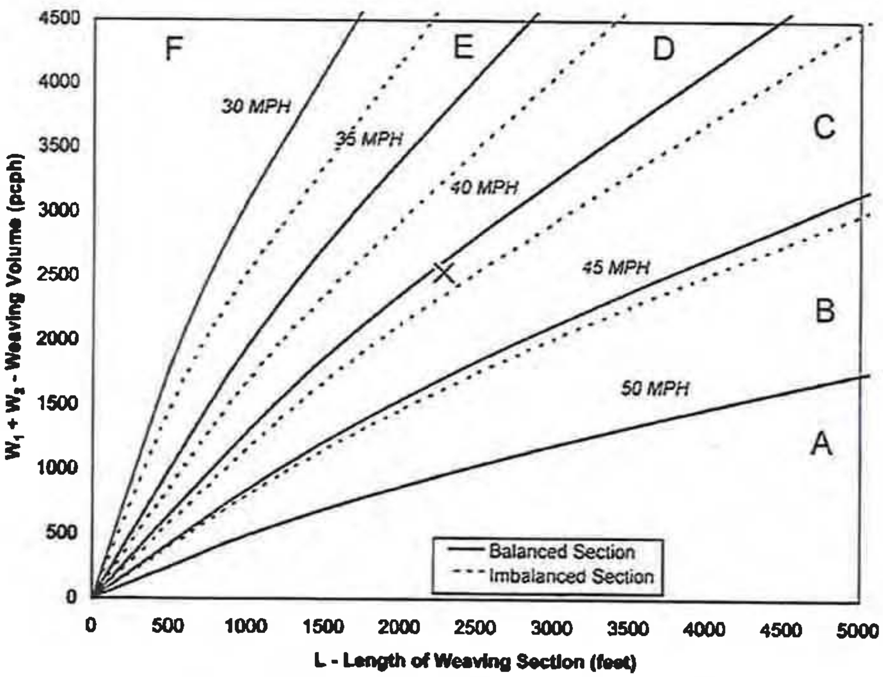
Data Input

Number of Entering Mainline Lanes	N_b	4
Number of Lanes in Weaving Section	N	5
Length of Weaving Section (feet)	L	2,275

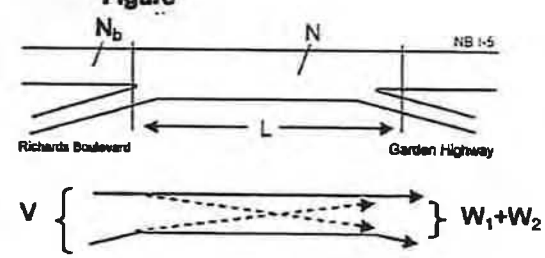
Project Information

Project	I-5 Richards Blvd Interchange
Scenario	2021 PP PM Conditions
Freeway	NB I-5
On-ramp	Richards Boulevard
Off-ramp	Garden Highway

Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	11,140	Volume (vph)*	1,296	Volume (vph)*	1,217
Truck Percentage	10%	Truck Percentage	2%	Truck Percentage	2%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	11,697	Volume (pcph)	1,309	Volume (pcph)	1,229



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **N**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   35 MPH and **40 MPH**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **39.0**
4. Weaving Intensity Factor (k) **2.63**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **2,739**
6. Level of Service (LOS) **F**

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: Do not adjust by a Peak Hour Factor (PHF). The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

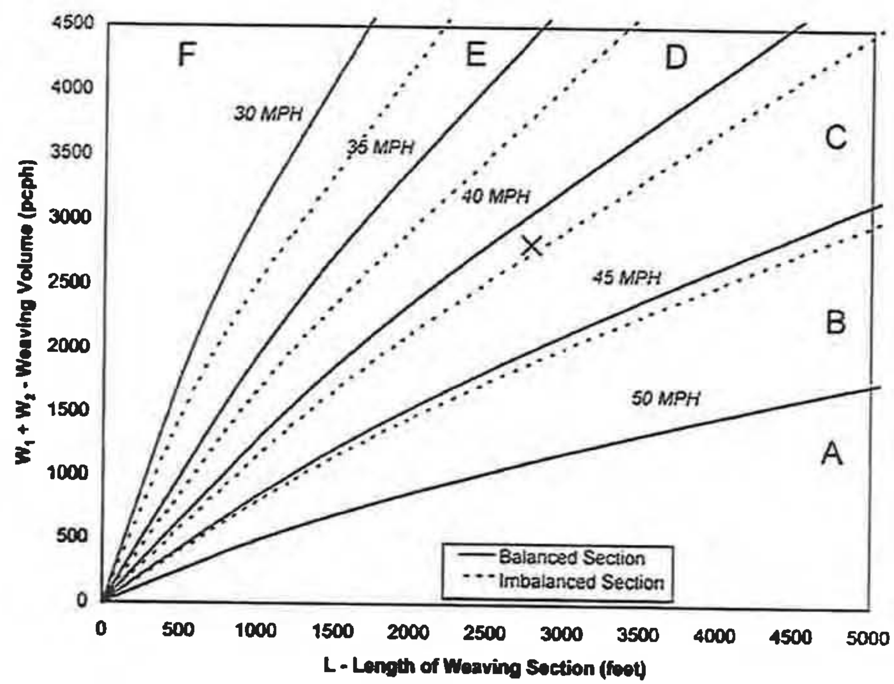
Data Input

Number of Entering Mainline Lanes	N_b	4
Number of Lanes in Weaving Section	N	5
Length of Weaving Section (feet)	L	2,775

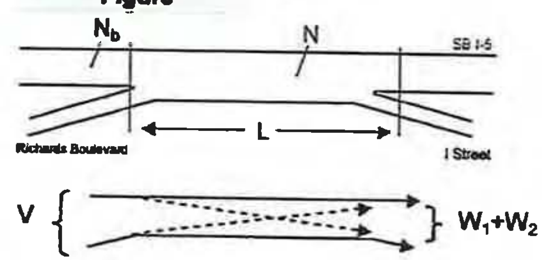
Project Information

Project	I-5 Richards Blvd Interchange
Scenario	2021 NP PM Conditions
Freeway	SB I-5
On-ramp	Richards Boulevard
Off-ramp	I Street

Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	8,854	Volume (vph)*	614	Volume (vph)*	2,190
Truck Percentage	10%	Truck Percentage	2%	Truck Percentage	2%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	9,297	Volume (pcph)	620	Volume (pcph)	2,212



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **Y**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   40 MPH and **45 MPH**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) 41.1
4. Weaving Intensity Factor (k) 2.71
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ 2,072
6. Level of Service (LOS) F

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.

* Note: Do not adjust by a Peak Hour Factor (PHF). The methodology incorporates the PHF in the Service Volume tables.

Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

Leisch Method for Weaving Analysis

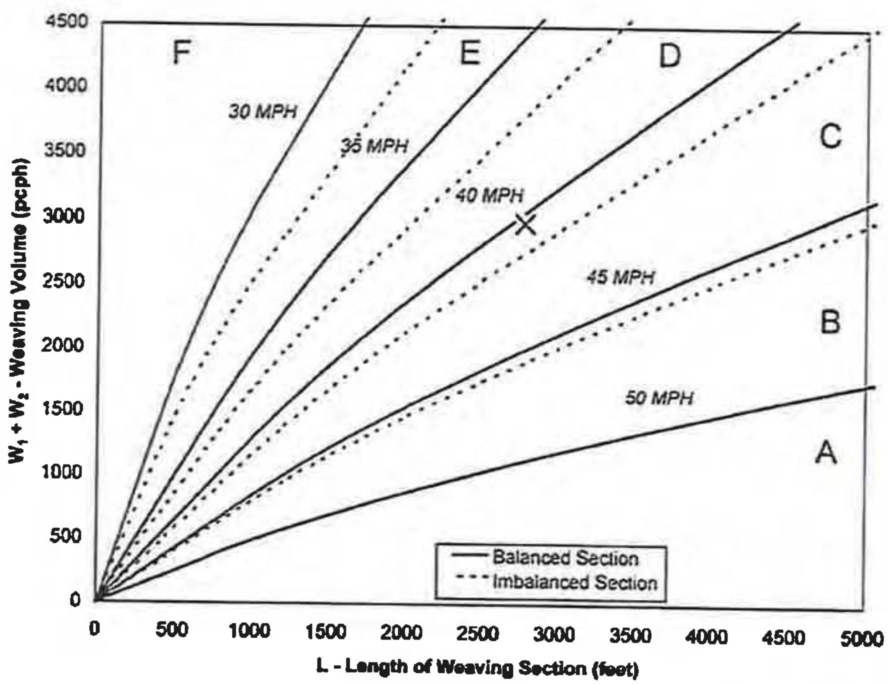
Data Input

Number of Entering Mainline Lanes	N_b	4
Number of Lanes in Weaving Section	N	5
Length of Weaving Section (feet)	L	2,775

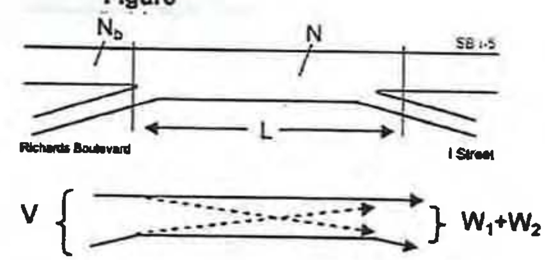
Project Information

Project	I-5 Richards Blvd Interchange
Scenario	2021 PP PM Conditions
Freeway	SB I-5
On-ramp	Richards Boulevard
Off-ramp	I Street

Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	9,010	Volume (vph)*	770	Volume (vph)*	2,190
Truck Percentage	10%	Truck Percentage	2%	Truck Percentage	2%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	9,461	Volume (pcph)	778	Volume (pcph)	2,212



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **Y**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   40 MPH and **45 MPH**
   If below the 50 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **40.4**
4. Weaving Intensity Factor (k) **2.50**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ 2,125
6. Level of Service (LOS) F

The LOS in the chart above refers to the capacity of weaving traffic only; through and ramp to ramp traffic is not included.
* Note: Do not adjust by a Peak Hour Factor (PHF). The methodology incorporates the PHF in the Service Volume tables.
Source: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983.

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7/21/2008

Appendix C: Design Year (2021) Calculations With Geometric Alternatives Conditions

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 New Alt A **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: Richards Blvd & I-5 SB Ramps **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	L	277	251	91	7	133.9	F	--
	R	155	140	90	7	53.8	D	--
	Subtotal	**432**	**391**	**91**	**--**	**105.1**	**F**	**--**
EB	T	125	68	54	18	369.5	F	--
	R	46	30	65	12	25.7	C	--
	Subtotal	**171**	**99**	**58**	**--**	**263.7**	**F**	**--**
WB	L	133	126	95	9	54.8	D	--
	T	84	73	87	12	21.0	C	--
	Subtotal	**217**	**199**	**91**	**--**	**42.4**	**D**	**--**
	Total	**821**	**689**	**84**	**--**	**109.8**	**F**	**--**

Intersection: 2: Richards Blvd & I-5 NB Ramps **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	27	21	78	5	203.0	F	--
	R	326	271	83	11	238.3	F	--
	Subtotal	**353**	**292**	**83**	**--**	**235.8**	**F**	**--**
EB	L	54	21	39	5	470.4	F	--
	T	348	295	85	15	16.8	B	--
	Subtotal	**402**	**316**	**79**	**--**	**46.8**	**D**	**--**
WB	T	190	179	94	14	25.6	C	--
	R	174	151	87	9	12.9	B	--
	Subtotal	**364**	**330**	**91**	**--**	**19.8**	**B**	**--**
	Total	**1120**	**938**	**84**	**--**	**96.2**	**F**	**--**

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 New Alt A **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Richards Blvd & Bercut Dr **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	117	113	97	11	62.0	E	--
	T	16	15	94	3	53.1	D	--
	R	24	27	113	4	16.5	B	--
	Subtotal	**158**	**155**	**97**	--	**53.2**	**D**	--
SB	L	14	13	93	2	74.0	E	--
	T	16	16	100	3	76.4	E	--
	R	38	36	95	5	29.9	C	--
	Subtotal	**68**	**65**	**96**	--	**50.5**	**D**	--
EB	L	71	58	82	8	31.4	C	--
	T	429	365	85	11	16.1	B	--
	R	174	141	81	10	7.3	A	--
	Subtotal	**674**	**565**	**84**	--	**15.5**	**B**	--
WB	L	19	16	84	4	330.3	F	--
	T	209	186	89	16	107.0	F	--
	R	16	13	81	6	92.4	F	--
	Subtotal	**245**	**215**	**88**	--	**122.5**	**F**	--
	Total	**1144**	**1000**	**87**	--	**46.6**	**D**	--

Intersection: 13: I-5 NB Ramps & **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	228	170	75	7	114.9	F	--
	Subtotal	**228**	**170**	**75**	--	**114.9**	**F**	--
	Total	**228**	**170**	**75**	--	**114.9**	**F**	--

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 New Alt A **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 16: I-5 SB Ramps & **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	T	179	160	89	8	63.3	E	--
	Subtotal	**179**	**160**	**89**	**--**	**63.3**	**E**	**--**
	Total	**179**	**160**	**89**	**--**	**63.3**	**E**	**--**

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SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alt A **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: Richards Blvd & I-5 SB Ramps **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	L	220	198	90	9	124.9	F	--
	R	122	112	92	12	81.5	F	--
	Subtotal	**342**	**309**	**90**	--	**109.2**	**F**	--
EB	T	179	115	64	11	558.3	F	--
	R	68	40	59	8	17.0	B	--
	Subtotal	**247**	**155**	**63**	--	**420.2**	**F**	--
WB	L	215	152	71	15	23.6	C	--
	T	149	111	74	12	31.2	C	--
	Subtotal	**364**	**264**	**73**	--	**26.8**	**C**	--
	Total	**954**	**728**	**76**	--	**145.6**	**F**	--

Intersection: 2: Richards Blvd & I-5 NB Ramps **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	30	23	77	6	180.1	F	--
	R	296	237	80	27	197.1	F	--
	Subtotal	**326**	**260**	**80**	--	**195.6**	**F**	--
EB	L	111	76	68	4	96.0	F	--
	T	288	259	90	8	25.7	C	--
	Subtotal	**399**	**335**	**84**	--	**41.6**	**D**	--
WB	T	334	246	74	20	29.3	C	--
	R	378	261	69	27	5.6	A	--
	Subtotal	**712**	**507**	**71**	--	**17.1**	**B**	--
	Total	**1438**	**1102**	**77**	--	**66.7**	**E**	--

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: *I-5 Richards* **HCM:** *2000*
Scenario: *2021 Alt A* **PHF:** *0.92*
TOD: *PM* **Analysis Period:** *15 Minutes* **# of Runs:** *10*

Intersection: *3: Richards Blvd & Bercut Dr* **Type:** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	185	144	78	15	307.6	F	--
	T	22	18	82	5	205.9	F	--
	R	14	11	79	4	31.0	C	--
	Subtotal	**220**	**173**	**79**	**--**	**279.6**	**F**	**--**
SB	L	27	17	63	5	292.7	F	--
	T	22	14	64	5	331.6	F	--
	R	82	59	72	16	286.0	F	--
	Subtotal	**130**	**90**	**69**	**--**	**294.4**	**F**	**--**
EB	L	60	53	88	6	80.9	F	--
	T	345	318	92	27	20.4	C	--
	R	179	148	83	14	8.9	A	--
	Subtotal	**584**	**519**	**89**	**--**	**23.3**	**C**	**--**
WB	L	22	14	64	4	528.0	F	--
	T	446	296	66	49	506.1	F	--
	R	19	14	74	5	510.1	F	--
	Subtotal	**486**	**324**	**67**	**--**	**507.2**	**F**	**--**
	Total	**1421**	**1106**	**78**	**--**	**227.3**	**F**	**--**

Intersection: *13: I-5 NB Ramps &* **Type:** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	489	338	69	22	14.6	B	--
	Subtotal	**489**	**338**	**69**	**--**	**14.6**	**B**	**--**
	Total	**489**	**338**	**69**	**--**	**14.6**	**B**	**--**

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: *I-5 Richards* ***HCM:*** *2000*
Scenario: *2021 Alt A* ***PHF:*** *0.92*
TOD: *PM* ***Analysis Period:*** *15 Minutes* ***# of Runs:*** *10*

Intersection: *16: I-5 SB Ramps &* ***Type:*** *Signalized*

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	T	283	194	69	16	20.4	C	--
	Subtotal	**283**	**194**	69	--	**20.4**	C	--
	Total	**283**	**194**	69	--	**20.4**	C	--

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SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 New Alt A **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: Richards Blvd & I-5 SB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	L	300	3779	Yes	--	3897	Yes	--
	R	150	175	Yes	--	183	Yes	--
EB	T	200	2506	Yes	--	2377	Yes	--
	R	200	208	Yes	--	206	Yes	--
WB	L	288	314	Yes	--	311	Yes	--
	T	288	316	Yes	--	300	Yes	--

Intersection: 2: Richards Blvd & I-5 NB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	400	392	--	--	357	--	--
	T	5530	4887	--	--	4994	--	--
	R	400	4887	Yes	--	4994	Yes	--
EB	L	288	309	Yes	--	318	Yes	--
	T	288	263	--	--	253	--	--
WB	T	238	274	Yes	--	297	Yes	--
	R	238	275	Yes	--	322	Yes	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 New Alt A **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Richards Blvd & Bercut Dr **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	200	319	Yes	--	306	Yes	--
	T	663	141	--	--	136	--	--
	R	663	141	--	--	136	--	--
SB	L	5220	209	--	--	187	--	--
	T	5220	209	--	--	187	--	--
	R	150	148	--	--	146	--	--
EB	L	200	213	Yes	--	221	Yes	--
	T	238	291	Yes	--	309	Yes	--
	R	238	261	Yes	--	271	Yes	--
WB	L	250	236	--	--	227	--	--
	T	500	531	Yes	--	507	Yes	--
	R	500	382	--	--	381	--	--

Intersection: 13: I-5 NB Ramps & **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	T	358	466	Yes	--	480	Yes	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project:	I-5 Richards	**HCM:**	2000
Scenario:	2021 New Alt A	**PHF:**	0.92
TOD:	AM	**Analysis Period:** 15 Minutes	**# of Runs:** 10

Intersection: 16: I-5 SB Ramps & **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	T	280	330	Yes	--	341	Yes	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alt A **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: Richards Blvd & I-5 SB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	L	300	3091	Yes	--	2853	Yes	--
	R	150	175	Yes	--	180	Yes	--
EB	T	200	5311	Yes	--	5475	Yes	--
	R	200	218	Yes	--	233	Yes	--
WB	L	288	215	--	--	220	--	--
	T	288	327	Yes	--	380	Yes	--

Intersection: 2: Richards Blvd & I-5 NB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	400	363	--	--	376	--	--
	T	5530	3911	--	--	3931	--	--
	R	400	3911	Yes	--	3931	Yes	--
EB	L	288	318	Yes	--	323	Yes	--
	T	288	369	Yes	--	355	Yes	--
WB	T	238	272	Yes	--	291	Yes	--
	R	238	274	Yes	--	291	Yes	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project:	*I-5 Richards*		***HCM:***	*2000*
Scenario:	*2021 Alt A*		***PHF:***	*0.92*
TOD:	*PM*	***Analysis Period:*** *15 Minutes*	***# of Runs:***	*10*

Intersection: *3: Richards Blvd & Bercut Dr* ***Type:*** *Signalized*

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	200	2923	Yes	--	2803	Yes	--
	T	663	2457	Yes	--	2286	Yes	--
	R	663	279	--	--	236	--	--
SB	L	5220	1575	--	--	1529	--	--
	T	5220	1575	--	--	1529	--	--
	R	150	175	Yes	--	188	Yes	--
EB	L	200	224	Yes	--	254	Yes	--
	T	238	298	Yes	--	308	Yes	--
	R	238	270	Yes	--	267	Yes	--
WB	L	250	260	Yes	--	285	Yes	--
	T	500	5251	Yes	--	5114	Yes	--
	R	500	525	Yes	--	547	Yes	--

Intersection: *13: I-5 NB Ramps &* ***Type:*** *Signalized*

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	T	358	336	--	--	342	--	--

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SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alt A **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 16: I-5 SB Ramps & **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	T	280	249	--	--	245	--	--

FEHR & PEERS
TRANSPORTATION CONSULTANTS

1: Richards Blvd & I-5 SB Ramps Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBR	All
Delay / Veh (s)	93.7	23.6	131.9	19.4	86.4	68.7	79.7
Vehicles Exited	87	43	111	88	246	109	684
Hourly Exit Rate	348	172	444	352	984	436	2736
Input Volume	500	185	533	338	1109	620	3285
% of Volume	70	93	83	104	89	70	83

2: Richards Blvd & I-5 NB Ramps Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBR	All
Delay / Veh (s)	271.2	17.2	43.8	11.0	150.8	200.8	90.2
Vehicles Exited	33	292	168	140	34	269	936
Hourly Exit Rate	132	1168	672	560	136	1076	3744
Input Volume	217	1392	761	696	109	1304	4479
% of Volume	61	84	88	80	125	83	84

3: Richards Blvd & Bercut Dr Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	25.8	18.4	8.2	344.7	143.6	126.6	116.2	20.0	13.7	78.3	66.6	46.4
Vehicles Exited	56	349	162	19	170	17	104	20	20	11	21	47
Hourly Exit Rate	224	1396	648	76	680	68	416	80	80	44	84	188
Input Volume	283	1717	696	76	837	65	467	65	98	54	65	152
% of Volume	79	81	93	100	81	105	89	123	82	81	129	124

3: Richards Blvd & Bercut Dr Performance by movement

Movement	All
Delay / Veh (s)	62.7
Vehicles Exited	996
Hourly Exit Rate	3984
Input Volume	4575
% of Volume	87

4: External Performance by approach

Approach	SB	All
Delay / Veh (s)	44.5	44.5
Vehicles Exited	201	201
Hourly Exit Rate	804	804
Input Volume	957	957
% of Volume	84	84

5: Bend Performance by approach

Approach	SB	All
Delay / Veh (s)	186.2	186.2
Vehicles Exited	381	381
Hourly Exit Rate	1524	1524
Input Volume	1729	1729
% of Volume	88	88

6: External Performance by approach

Approach	SB	All
Delay / Veh (s)	0.3	0.3
Vehicles Exited	156	156
Hourly Exit Rate	624	624
Input Volume	717	717
% of Volume	87	87

8: External Performance by approach

Approach	SB	All
Delay / Veh (s)	25.9	25.9
Vehicles Exited	202	202
Hourly Exit Rate	808	808
Input Volume	837	837
% of Volume	97	97

9: External Performance by approach

Approach	EB	All
Delay / Veh (s)	31.2	31.2
Vehicles Exited	383	383
Hourly Exit Rate	1532	1532
Input Volume	1869	1869
% of Volume	82	82

10: Bend Performance by approach

Approach	NB	All
Delay / Veh (s)	4.1	4.1
Vehicles Exited	170	170
Hourly Exit Rate	680	680
Input Volume	913	913
% of Volume	74	74

11: External Performance by approach

Approach	NB	All
Delay / Veh (s)	16.4	16.4
Vehicles Exited	99	99
Hourly Exit Rate	396	396
Input Volume	413	413
% of Volume	96	96

13: I-5 NB Ramps & Performance by movement

Movement	NBT	All
Delay / Veh (s)	104.3	104.3
Vehicles Exited	170	170
Hourly Exit Rate	680	680
Input Volume	913	913
% of Volume	74	74

16: I-5 SB Ramps & Performance by movement

Movement	SBT	All
Delay / Veh (s)	87.1	87.1
Vehicles Exited	158	158
Hourly Exit Rate	632	632
Input Volume	718	718
% of Volume	88	88

17: Bend Performance by approach

Approach	SB	All
Delay / Veh (s)	4.0	4.0
Vehicles Exited	157	157
Hourly Exit Rate	628	628
Input Volume	717	717
% of Volume	88	88

18: External Performance by approach

Approach	NB	All
Delay / Veh (s)	0.2	0.2
Vehicles Exited	172	172
Hourly Exit Rate	688	688
Input Volume	913	913
% of Volume	75	75

19: Bend Performance by approach

Approach	NB	SW	All
Delay / Veh (s)	63.3	1.6	29.4
Vehicles Exited	155	198	353
Hourly Exit Rate	620	792	1412
Input Volume	685	957	1642
% of Volume	91	83	86

20: Bend Performance by approach

Approach	NB	SB	All
Delay / Veh (s)	23.5	6.3	14.3
Vehicles Exited	168	200	368
Hourly Exit Rate	672	800	1472
Input Volume	630	837	1467
% of Volume	107	96	100

Total Network Performance

Delay / Veh (s)	268.9
Vehicles Exited	1214
Hourly Exit Rate	4856
Input Volume	26144
% of Volume	19

1: Richards Blvd & I-5 SB Ramps Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBR	All
Delay / Veh (s)	108.2	16.9	23.6	31.2	93.6	81.1	65.8
Vehicles Exited	115	40	152	111	198	112	728
Hourly Exit Rate	460	160	608	444	792	448	2912
Input Volume	717	272	859	598	880	489	3815
% of Volume	64	59	71	74	90	92	76

2: Richards Blvd & I-5 NB Ramps Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBR	All
Delay / Veh (s)	96.0	25.7	29.3	5.6	184.2	200.5	72.0
Vehicles Exited	76	259	246	261	23	237	1102
Hourly Exit Rate	304	1036	984	1044	92	948	4408
Input Volume	446	1152	1338	1511	120	1185	5752
% of Volume	68	90	74	69	77	80	77

3: Richards Blvd & Bercut Dr Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	81.6	20.4	8.9	530.5	513.5	540.9	150.4	48.4	31.6	315.6	346.5	298.1
Vehicles Exited	53	318	148	14	296	14	144	18	11	17	14	59
Hourly Exit Rate	212	1272	592	56	1184	56	576	72	44	68	56	236
Input Volume	239	1381	717	87	1783	76	739	87	54	109	87	326
% of Volume	89	92	83	64	66	74	78	83	81	62	64	72

3: Richards Blvd & Bercut Dr Performance by movement

Movement	All
Delay / Veh (s)	232.2
Vehicles Exited	1106
Hourly Exit Rate	4424
Input Volume	5685
% of Volume	78

4: External Performance by approach

Approach	SB	All
Delay / Veh (s)	45.1	45.1
Vehicles Exited	219	219
Hourly Exit Rate	876	876
Input Volume	1087	1087
% of Volume	81	81

5: Bend Performance by approach

Approach	SB	All
Delay / Veh (s)	31.1	31.1
Vehicles Exited	325	325
Hourly Exit Rate	1300	1300
Input Volume	1369	1369
% of Volume	95	95

6: External Performance by approach

Approach	SB	All
Delay / Veh (s)	0.3	0.3
Vehicles Exited	196	196
Hourly Exit Rate	784	784
Input Volume	1130	1130
% of Volume	69	69

8: External Performance by approach

Approach	SB	All
Delay / Veh (s)	23.3	23.3
Vehicles Exited	178	178
Hourly Exit Rate	712	712
Input Volume	891	891
% of Volume	80	80

9: External Performance by approach

Approach	EB	All
Delay / Veh (s)	29.1	29.1
Vehicles Exited	330	330
Hourly Exit Rate	1320	1320
Input Volume	1543	1543
% of Volume	86	86

10: Bend Performance by approach

Approach	NB	All
Delay / Veh (s)	5.4	5.4
Vehicles Exited	339	339
Hourly Exit Rate	1356	1356
Input Volume	1957	1957
% of Volume	69	69

11: External Performance by approach

Approach	NB	All
Delay / Veh (s)	15.8	15.8
Vehicles Exited	83	83
Hourly Exit Rate	332	332
Input Volume	402	402
% of Volume	83	83

13: I-5 NB Ramps & Performance by movement

Movement	NBT	All
Delay / Veh (s)	14.6	14.6
Vehicles Exited	338	338
Hourly Exit Rate	1352	1352
Input Volume	1957	1957
% of Volume	69	69

16: I-5 SB Ramps & Performance by movement

Movement	SBT	All
Delay / Veh (s)	20.4	20.4
Vehicles Exited	194	194
Hourly Exit Rate	776	776
Input Volume	1132	1132
% of Volume	69	69

17: Bend Performance by approach

Approach	SB	All
Delay / Veh (s)	3.7	3.7
Vehicles Exited	195	195
Hourly Exit Rate	780	780
Input Volume	1130	1130
% of Volume	69	69

18: External Performance by approach

Approach	NB	All
Delay / Veh (s)	0.5	0.5
Vehicles Exited	339	339
Hourly Exit Rate	1356	1356
Input Volume	1957	1957
% of Volume	69	69

19: Bend Performance by approach

Approach	NB	SW	All
Delay / Veh (s)	449.3	1.7	208.9
Vehicles Exited	153	226	379
Hourly Exit Rate	612	904	1516
Input Volume	989	1087	2076
% of Volume	62	83	73

20: Bend Performance by approach

Approach	NB	SB	All
Delay / Veh (s)	159.7	6.0	88.6
Vehicles Exited	186	172	358
Hourly Exit Rate	744	688	1432
Input Volume	880	891	1771
% of Volume	85	77	81

Total Network Performance

Delay / Veh (s)	373.0
Vehicles Exited	1345
Hourly Exit Rate	5380
Input Volume	33654
% of Volume	16

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project:	I-5 Richards	**HCM:**	2000
Scenario:	2021 Alternative B	**PHF:**	0.92
TOD:	AM — **Analysis Period:** 15 Minutes	**# of Runs:**	10

Intersection: 1: Richards Blvd & I-5 SB Ramps — **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	L	277	249	90	10	159.1	F	--
	R	155	140	90	13	57.2	E	--
	Subtotal	**432**	**389**	**90**	--	**122.4**	**F**	--
EB	T	125	63	50	20	454.2	F	--
	R	46	27	59	9	27.7	C	--
	Subtotal	**171**	**90**	**53**	--	**325.7**	**F**	--
WB	L	133	124	93	10	72.9	E	--
	T	84	77	92	12	20.6	C	--
	Subtotal	**217**	**201**	**93**	--	**52.8**	**D**	--
	Total	**821**	**680**	**83**	--	**128.7**	**F**	--

Intersection: 2: Richards Blvd & I-5 NB Ramps — **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	27	21	78	6	272.5	F	--
	R	326	259	79	8	318.5	F	--
	Subtotal	**353**	**280**	**79**	--	**315.0**	**F**	--
EB	L	54	24	44	8	420.7	F	--
	T	348	287	82	13	40.4	D	--
	Subtotal	**402**	**311**	**77**	--	**69.5**	**E**	--
WB	T	190	177	93	14	37.2	D	--
	R	174	150	86	9	18.9	B	--
	Subtotal	**364**	**326**	**90**	--	**28.9**	**C**	--
	Total	**1120**	**918**	**82**	--	**130.0**	**F**	--

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alternative B **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Richards Blvd & Bercut Dr **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	117	113	97	10	85.9	F	--
	T	16	16	100	4	55.1	E	--
	R	24	25	104	7	28.8	C	--
	Subtotal	**158**	**154**	**97**	--	**73.4**	**E**	--
SB	L	14	14	100	3	97.9	F	--
	T	16	17	100	4	88.0	F	--
	R	38	37	97	5	30.0	C	--
	Subtotal	**68**	**68**	**100**	--	**58.3**	**E**	--
EB	L	71	57	80	7	32.3	C	--
	T	429	357	83	12	18.9	B	--
	R	174	133	76	8	4.0	A	--
	Subtotal	**674**	**546**	**81**	--	**16.7**	**B**	--
WB	L	19	16	84	3	276.9	F	--
	T	209	180	86	13	121.1	F	--
	R	16	13	81	3	115.2	F	--
	Subtotal	**245**	**209**	**85**	--	**132.3**	**F**	--
	Total	**1144**	**977**	**85**	--	**53.2**	**D**	--

Intersection: 13: I-5 NB Ramps & **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	228	171	75	6	117.6	F	--
	Subtotal	**228**	**171**	**75**	--	**117.6**	**F**	--
	Total	**228**	**171**	**75**	--	**117.6**	**F**	--

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alternative B **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 16: I-5 SB Ramps & **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	T	179	151	84	11	52.6	D	--
	Subtotal	**179**	**151**	84	--	**52.6**	**D**	--
	Total	**179**	**151**	84	--	**52.6**	**D**	--

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alternative B **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 13: I-5 NB Ramps & **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	489	348	71	14	20.3	C	--
	Subtotal	**489**	**348**	**71**	**--**	**20.3**	**C**	**--**
	Total	**489**	**348**	**71**	**--**	**20.3**	**C**	**--**

Intersection: 16: I-5 SB Ramps & **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	T	283	208	73	17	25.3	C	--
	Subtotal	**283**	**208**	**73**	**--**	**25.3**	**C**	**--**
	Total	**283**	**208**	**73**	**--**	**25.3**	**C**	**--**

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alternative B **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: Richards Blvd & I-5 SB Ramps **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	L	220	192	87	12	141.9	F	--
	R	122	103	84	9	79.8	E	--
	Subtotal	**342**	**296**	**87**	--	**120.2**	**F**	--
EB	T	179	143	80	10	345.7	F	--
	R	68	56	82	9	22.9	C	--
	Subtotal	**247**	**199**	**80**	--	**255.1**	**F**	--
WB	L	215	161	75	20	69.3	E	--
	T	149	120	81	13	5.9	A	--
	Subtotal	**364**	**281**	**77**	--	**42.2**	**D**	--
	Total	**954**	**775**	**81**	--	**126.5**	**F**	--

Intersection: 2: Richards Blvd & I-5 NB Ramps **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	30	28	93	8	175.3	F	--
	R	296	242	82	17	213.9	F	--
	Subtotal	**326**	**270**	**83**	--	**209.9**	**F**	--
EB	L	111	83	75	5	74.1	E	--
	T	288	275	95	13	22.8	C	--
	Subtotal	**399**	**357**	**89**	--	**34.7**	**C**	--
WB	T	334	251	75	17	30.7	C	--
	R	378	270	71	19	6.2	A	--
	Subtotal	**712**	**521**	**73**	--	**18.0**	**B**	--
	Total	**1438**	**1148**	**80**	--	**68.3**	**E**	--

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alternative B **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Richards Blvd & Bercut Dr **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	185	137	74	7	403.0	F	--
	T	22	17	77	6	282.7	F	--
	R	14	11	79	2	35.7	D	--
	Subtotal	**220**	**165**	**75**	**--**	**366.9**	**F**	**--**
SB	L	27	18	67	3	537.6	F	--
	T	22	16	73	3	568.2	F	--
	R	82	55	67	6	462.9	F	--
	Subtotal	**130**	**89**	**68**	**--**	**497.0**	**F**	**--**
EB	L	60	49	82	7	69.8	E	--
	T	345	302	88	17	16.3	B	--
	R	179	158	88	19	3.3	A	--
	Subtotal	**584**	**509**	**87**	**--**	**17.5**	**B**	**--**
WB	L	22	16	73	5	506.0	F	--
	T	446	317	71	25	495.8	F	--
	R	19	14	74	3	504.8	F	--
	Subtotal	**486**	**346**	**71**	**--**	**496.6**	**F**	**--**
	Total	**1421**	**1108**	**78**	**--**	**257.2**	**F**	**--**

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alternative B **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: Richards Blvd & I-5 SB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	L	300	4301	Yes	--	4183	Yes	--
	R	150	175	Yes	--	191	Yes	--
EB	T	200	3001	Yes	--	2926	Yes	--
	R	200	209	Yes	--	227	Yes	--
WB	L	281	240	--	--	237	--	--
	T	281	295	Yes	--	292	Yes	--

Intersection: 2: Richards Blvd & I-5 NB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	400	358	--	--	345	--	--
	T	5530	5294	--	--	5708	Yes	--
	R	400	5294	Yes	--	5708	Yes	--
EB	L	281	308	Yes	--	310	Yes	--
	T	281	335	Yes	--	345	Yes	--
WB	T	243	285	Yes	--	296	Yes	--
	R	243	284	Yes	--	318	Yes	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alternative B **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Richards Blvd & Bercut Dr **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	200	913	Yes	--	586	Yes	--
	T	677	717	Yes	--	398	--	--
	R	677	247	--	--	226	--	--
SB	L	5220	214	--	--	224	--	--
	T	5220	214	--	--	224	--	--
	R	150	166	Yes	--	177	Yes	--
EB	L	200	224	Yes	--	252	Yes	--
	T	243	295	Yes	--	297	Yes	--
	R	243	311	Yes	--	357	Yes	--
WB	L	250	273	Yes	--	273	Yes	--
	T	500	1620	Yes	--	1301	Yes	--
	R	500	456	--	--	455	--	--

Intersection: 13: I-5 NB Ramps & **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	T	358	468	Yes	--	486	Yes	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alternative B **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 16: I-5 SB Ramps & **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	T	278	313	Yes	--	317	Yes	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alternative B **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: Richards Blvd & I-5 SB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	L	300	3165	Yes	--	3194	Yes	--
	R	150	175	Yes	--	195	Yes	--
EB	T	200	4269	Yes	--	4267	Yes	--
	R	200	217	Yes	--	238	Yes	--
WB	L	281	292	Yes	--	323	Yes	--
	T	281	188	--	--	178	--	--

Intersection: 2: Richards Blvd & I-5 NB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	400	392	--	--	408	Yes	--
	T	5530	3717	--	--	3807	--	--
	R	400	3717	Yes	--	3807	Yes	--
EB	L	281	309	Yes	--	336	Yes	--
	T	281	319	Yes	--	329	Yes	--
WB	T	243	276	Yes	--	285	Yes	--
	R	243	319	Yes	--	340	Yes	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alternative B **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Richards Blvd & Bercut Dr **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	200	3556	Yes	--	3580	Yes	--
	T	677	3081	Yes	--	3016	Yes	--
	R	677	282	--	--	209	--	--
SB	L	5220	2223	--	--	2225	--	--
	T	5220	2223	--	--	2225	--	--
	R	150	175	Yes	--	200	Yes	--
EB	L	200	222	Yes	--	253	Yes	--
	T	243	281	Yes	--	305	Yes	--
	R	243	211	--	--	233	--	--
WB	L	250	274	Yes	--	310	Yes	--
	T	500	5344	Yes	--	5203	Yes	--
	R	500	525	Yes	--	532	Yes	--

Intersection: 13: I-5 NB Ramps & **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	T	358	416	Yes	--	444	Yes	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alternative B **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 16: I-5 SB Ramps & **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	T	278	290	Yes	--	321	Yes	--

AHB
AM Peak Hour

1: Richards Blvd & I-5 SB Ramps Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBR	All
Delay / Veh (s)	191.9	28.1	72.4	20.6	73.6	57.3	73.4
Vehicles Exited	63	27	124	77	249	140	680
Hourly Exit Rate	252	108	496	308	996	560	2720
Input Volume	500	185	533	338	1109	620	3285
% of Volume	50	58	93	91	90	90	83

2: Richards Blvd & I-5 NB Ramps Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBR	All
Delay / Veh (s)	419.4	40.4	37.2	19.0	274.9	318.5	134.0
Vehicles Exited	24	287	177	150	21	259	918
Hourly Exit Rate	96	1148	708	600	84	1036	3672
Input Volume	217	1392	761	696	109	1304	4479
% of Volume	44	82	93	86	77	79	82

3: Richards Blvd & Bercut Dr Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	32.1	18.9	4.0	267.5	121.8	112.1	67.9	37.4	28.6	94.1	89.5	30.6
Vehicles Exited	57	357	133	16	180	13	113	16	25	14	16	37
Hourly Exit Rate	228	1428	532	64	720	52	452	64	100	56	64	148
Input Volume	283	1717	696	76	837	65	467	65	98	54	65	152
% of Volume	81	83	76	84	86	80	97	98	102	104	98	97

3: Richards Blvd & Bercut Dr Performance by movement

Movement	All
Delay / Veh (s)	52.3
Vehicles Exited	977
Hourly Exit Rate	3908
Input Volume	4575
% of Volume	85

13: I-5 NB Ramps & Performance by movement

Movement	NBT	All
Delay / Veh (s)	117.7	117.7
Vehicles Exited	171	171
Hourly Exit Rate	684	684
Input Volume	913	913
% of Volume	75	75

16: I-5 SB Ramps & Performance by movement

Movement	SBT	All
Delay / Veh (s)	52.5	52.5
Vehicles Exited	151	151
Hourly Exit Rate	604	604
Input Volume	718	718
% of Volume	84	84

Total Network Performance

Delay / Veh (s)	286.1
Vehicles Exited	1187
Hourly Exit Rate	4748
Input Volume	26144
% of Volume	18

1: Richards Blvd & I-5 SB Ramps Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBR	All
Delay / Veh (s)	82.0	22.7	69.3	5.8	103.6	79.2	68.9
Vehicles Exited	143	56	161	120	192	103	775
Hourly Exit Rate	572	224	644	480	768	412	3100
Input Volume	717	272	859	598	880	489	3815
% of Volume	80	82	75	80	87	84	81

2: Richards Blvd & I-5 NB Ramps Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBR	All
Delay / Veh (s)	74.6	22.8	30.7	6.2	177.8	215.6	73.1
Vehicles Exited	83	274	251	270	28	242	1148
Hourly Exit Rate	332	1096	1004	1080	112	968	4592
Input Volume	446	1152	1338	1511	120	1185	5752
% of Volume	74	95	75	71	93	82	80

3: Richards Blvd & Bercut Dr Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	69.9	16.3	3.3	539.2	496.5	526.1	169.4	48.1	35.2	523.0	564.2	469.8
Vehicles Exited	49	302	158	16	316	14	137	17	11	18	16	55
Hourly Exit Rate	196	1208	632	64	1264	56	548	68	44	72	64	220
Input Volume	239	1381	717	87	1783	76	739	87	54	109	87	326
% of Volume	82	87	88	74	71	74	74	78	81	66	74	67

3: Richards Blvd & Bercut Dr Performance by movement

Movement	All
Delay / Veh (s)	244.9
Vehicles Exited	1109
Hourly Exit Rate	4436
Input Volume	5685
% of Volume	78

13: I-5 NB Ramps & Performance by movement

Movement	NBT	All
Delay / Veh (s)	20.3	20.3
Vehicles Exited	348	348
Hourly Exit Rate	1392	1392
Input Volume	1957	1957
% of Volume	71	71

16: I-5 SB Ramps & Performance by movement

Movement	SBT	All
Delay / Veh (s)	25.3	25.2
Vehicles Exited	208	208
Hourly Exit Rate	832	832
Input Volume	1132	1132
% of Volume	73	73

Total Network Performance

Delay / Veh (s)	385.6
Vehicles Exited	1359
Hourly Exit Rate	5436
Input Volume	33654
% of Volume	16

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alt A+B **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: Richards Blvd & I-5 SB Ramps **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	L	220	254	115	9	141.1	F	--
	R	122	144	118	5	55.3	E	--
	Subtotal	**342**	**398**	**116**	--	**110.0**	**F**	--
EB	T	179	66	37	22	408.3	F	--
	R	68	27	40	13	40.4	D	--
	Subtotal	**247**	**93**	**38**	--	**300.7**	**F**	--
WB	L	215	126	59	9	53.2	D	--
	T	149	76	51	8	21.9	C	--
	Subtotal	**364**	**202**	**55**	--	**41.4**	**D**	--
	Total	**954**	**693**	**73**	--	**115.6**	**F**	--

Intersection: 2: Richards Blvd & I-5 NB Ramps **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	30	23	77	5	171.7	F	--
	R	296	284	96	8	199.1	F	--
	Subtotal	**326**	**306**	**94**	--	**197.1**	**F**	--
EB	L	111	25	22	7	413.4	F	--
	T	288	293	102	14	7.6	A	--
	Subtotal	**399**	**318**	**80**	--	**38.9**	**D**	--
WB	T	334	182	54	12	29.0	C	--
	R	378	152	40	8	13.9	B	--
	Subtotal	**712**	**334**	**47**	--	**22.1**	**C**	--
	Total	**1438**	**958**	**67**	--	**83.6**	**F**	--

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alt A+B **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Richards Blvd & Bercut Dr **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	185	115	62	10	63.4	E	--
	T	22	15	68	5	53.8	D	--
	R	14	26	186	6	18.0	B	--
	Subtotal	**220**	**156**	**71**	--	**55.0**	**D**	--
SB	L	27	13	48	2	72.2	E	--
	T	22	15	68	4	71.8	E	--
	R	82	37	45	8	28.6	C	--
	Subtotal	**130**	**65**	**50**	--	**47.2**	**D**	--
EB	L	60	61	102	7	32.7	C	--
	T	345	365	106	11	14.7	B	--
	R	179	151	84	11	6.6	A	--
	Subtotal	**584**	**577**	**99**	--	**14.5**	**B**	--
WB	L	22	15	68	3	195.3	F	--
	T	446	186	42	11	106.2	F	--
	R	19	14	74	3	101.6	F	--
	Subtotal	**486**	**215**	**44**	--	**112.3**	**F**	--
	Total	**1421**	**1013**	**71**	--	**43.6**	**D**	--

Intersection: 13: I-5 NB Ramps & **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	489	173	35	7	113.5	F	--
	Subtotal	**489**	**173**	**35**	--	**113.5**	**F**	--
	Total	**489**	**173**	**35**	--	**113.5**	**F**	--

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SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alt A+B **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 16: I-5 SB Ramps & **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	T	283	154	54	8	61.4	E	--
	Subtotal	**283**	**154**	**54**	**--**	**61.4**	**E**	**--**
	Total	**283**	**154**	**54**	**--**	**61.4**	**E**	**--**

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alt / A+R **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: Richards Blvd & I-5 SB Ramps **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	L	220	185	84	13	148.7	F	--
	R	122	109	89	8	87.0	F	--
	Subtotal	**342**	**294**	**86**	--	**125.7**	**F**	--
EB	T	179	124	69	11	564.4	F	--
	R	68	40	59	7	38.1	D	--
	Subtotal	**247**	**164**	**66**	--	**435.5**	**F**	--
WB	L	215	151	70	13	30.5	C	--
	T	149	114	77	10	9.9	A	--
	Subtotal	**364**	**265**	**73**	--	**21.6**	**C**	--
	Total	**954**	**723**	**76**	--	**157.8**	**F**	--

Intersection: 2: Richards Blvd & I-5 NB Ramps **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	30	24	80	5	104.1	F	--
	R	296	257	86	11	130.7	F	--
	Subtotal	**326**	**281**	**86**	--	**128.4**	**F**	--
EB	L	111	76	68	2	125.7	F	--
	T	288	255	89	13	24.2	C	--
	Subtotal	**399**	**331**	**83**	--	**47.5**	**D**	--
WB	T	334	251	75	17	32.3	C	--
	R	378	261	69	15	5.8	A	--
	Subtotal	**712**	**512**	**72**	--	**18.8**	**B**	--
	Total	**1438**	**1123**	**78**	--	**54.6**	**D**	--

SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alt. A+B **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Richards Blvd & Bercut Dr **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	185	141	76	10	384.5	F	--
	T	22	18	82	3	271.6	F	--
	R	14	12	86	4	27.1	C	--
	Subtotal	**220**	**171**	**78**	--	**347.8**	**F**	--
SB	L	27	17	63	4	376.5	F	--
	T	22	15	68	4	409.1	F	--
	R	82	58	71	8	357.7	F	--
	Subtotal	**130**	**91**	**70**	--	**369.8**	**F**	--
EB	L	60	52	87	4	68.8	E	--
	T	345	323	94	16	20.3	C	--
	R	179	161	90	11	8.1	A	--
	Subtotal	**584**	**536**	**92**	--	**21.4**	**C**	--
WB	L	22	15	68	3	502.3	F	--
	T	446	306	69	17	465.1	F	--
	R	19	15	79	3	467.0	F	--
	Subtotal	**486**	**336**	**69**	--	**466.8**	**F**	--
	Total	**1421**	**1133**	**80**	--	**230.6**	**F**	--

Intersection: 13: I-5 NB Ramps & **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	489	338	69	13	15.2	B	--
	Subtotal	**489**	**338**	**69**	--	**15.2**	**B**	--
	Total	**489**	**338**	**69**	--	**15.2**	**B**	--

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SIMTRAFFIC LEVEL OF SERVICE REPORT
Including Upstream Delays

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alt A+B **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 16: I-5 SB Ramps & **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	T	283	193	68	14	28.8	C	--
	Subtotal	**283**	**193**	**68**	**--**	**28.8**	**C**	**--**
	Total	**283**	**193**	**68**	**--**	**28.8**	**C**	**--**

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SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alt ' A+B **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: Richards Blvd & I-5 SB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	L	300	3547	Yes	--	3202	Yes	--
	R	150	175	Yes	--	189	Yes	--
EB	T	200	2583	Yes	--	2439	Yes	--
	R	200	217	Yes	--	246	Yes	--
WB	L	281	275	--	--	298	Yes	--
	T	281	324	Yes	--	327	Yes	--

Intersection: 2: Richards Blvd & I-5 NB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	400	329	--	--	341	--	--
	T	5530	4830	--	--	4761	--	--
	R	400	4830	Yes	--	4761	Yes	--
EB	L	281	309	Yes	--	313	Yes	--
	T	281	237	--	--	215	--	--
WB	T	238	269	Yes	--	293	Yes	--
	R	238	277	Yes	--	318	Yes	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alt ! A+B **PHF:** 0.92
TOD: AM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Richards Blvd & Bercut Dr **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	200	346	Yes	--	318	Yes	--
	T	663	138	--	--	141	--	--
	R	663	138	--	--	141	--	--
SB	L	5220	194	--	--	180	--	--
	T	5220	194	--	--	180	--	--
	R	150	165	Yes	--	154	Yes	--
EB	L	200	222	Yes	--	246	Yes	--
	T	238	293	Yes	--	305	Yes	--
	R	238	256	Yes	--	271	Yes	--
WB	L	250	234	--	--	238	--	--
	T	500	519	Yes	--	478	--	--
	R	500	386	--	--	385	--	--

Intersection: 13: I-5 NB Ramps & **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	T	358	467	Yes	--	485	Yes	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project:	*I-5 Richards*	***HCM:***	*2000*
Scenario:	*2021 Alt* A+B	***PHF:***	*0.92*
TOD:	*AM* ***Analysis Period:*** *15 Minutes*	***# of Runs:***	*10*

Intersection: *16: I-5 SB Ramps &* ***Type:*** *Signalized*

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	T	278	333	Yes	--	342	Yes	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alt LA+B **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: Richards Blvd & I-5 SB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	L	300	3632	Yes	--	3472	Yes	--
	R	150	175	Yes	--	200	Yes	--
EB	T	200	5572	Yes	--	5733	Yes	--
	R	200	221	Yes	--	246	Yes	--
WB	L	281	266	--	--	278	--	--
	T	281	167	--	--	174	--	--

Intersection: 2: Richards Blvd & I-5 NB Ramps **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	400	307	--	--	297	--	--
	T	5530	2354	--	--	2212	--	--
	R	400	2354	Yes	--	2212	Yes	--
EB	L	281	307	Yes	--	305	Yes	--
	T	281	376	Yes	--	383	Yes	--
WB	T	238	277	Yes	--	283	Yes	--
	R	238	278	Yes	--	294	Yes	--

SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alt A+B **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Richards Blvd & Bercut Dr **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	L	200	3469	Yes	--	3510	Yes	--
	T	663	2887	Yes	--	2921	Yes	--
	R	663	161	--	--	160	--	--
SB	L	5220	1758	--	--	1787	--	--
	T	5220	1758	--	--	1787	--	--
	R	150	175	Yes	--	183	Yes	--
EB	L	200	224	Yes	--	246	Yes	--
	T	238	301	Yes	--	312	Yes	--
	R	238	269	Yes	--	273	Yes	--
WB	L	250	262	Yes	--	294	Yes	--
	T	500	5310	Yes	--	5089	Yes	--
	R	500	525	Yes	--	548	Yes	--

Intersection: 13: I-5 NB Ramps & **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
NB	T	358	331	--	--	342	--	--

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SIMTRAFFIC QUEUING REPORT
Including Upstream Queues

Project: I-5 Richards **HCM:** 2000
Scenario: 2021 Alt : A+B **PHF:** 0.92
TOD: PM **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 16: I-5 SB Ramps & **Type:** Signalized

Approach	Movement	Storage Length	Maximum Queue (ft)			95th Queue (ft)		
			Avg	> Storage	Std Dev	Avg	> Storage	Std Dev
SB	T	278	333	Yes	--	350	Yes	--

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1: Richards Blvd & I-5 SB Ramps Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBR	All
Delay / Veh (s)	194.5	39.6	53.1	21.8	66.4	55.1	68.4
Vehicles Exited	66	27	126	76	254	144	693
Hourly Exit Rate	264	108	504	304	1016	576	2772
Input Volume	500	185	533	338	1109	620	3285
% of Volume	53	58	95	90	92	93	84

2: Richards Blvd & I-5 NB Ramps Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBR	All
Delay / Veh (s)	407.1	7.6	29.0	13.8	171.6	199.0	85.9
Vehicles Exited	24	293	182	152	23	284	958
Hourly Exit Rate	96	1172	728	608	92	1136	3832
Input Volume	217	1392	761	696	109	1304	4479
% of Volume	44	84	96	87	84	87	86

3: Richards Blvd & Bercut Dr Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	32.9	14.8	6.6	186.2	106.5	104.6	46.3	35.7	17.7	70.5	72.6	28.8
Vehicles Exited	61	365	151	15	186	14	115	15	26	13	15	37
Hourly Exit Rate	244	1460	604	60	744	56	460	60	104	52	60	148
Input Volume	283	1717	696	76	837	65	467	65	98	54	65	152
% of Volume	86	85	87	79	89	86	99	92	106	96	92	97

3: Richards Blvd & Bercut Dr Performance by movement

Movement	All
Delay / Veh (s)	42.4
Vehicles Exited	1013
Hourly Exit Rate	4052
Input Volume	4575
% of Volume	89

13: I-5 NB Ramps & Performance by movement

Movement	NBT	All
Delay / Veh (s)	113.3	113.3
Vehicles Exited	173	173
Hourly Exit Rate	692	692
Input Volume	913	913
% of Volume	76	76

16: I-5 SB Ramps & Performance by movement

Movement	SBT	All
Delay / Veh (s)	61.4	61.4
Vehicles Exited	154	154
Hourly Exit Rate	616	616
Input Volume	718	718
% of Volume	86	86

Total Network Performance

Delay / Veh (s)	230.0
Vehicles Exited	1228
Hourly Exit Rate	4912
Input Volume	26144
% of Volume	19

1: Richards Blvd & I-5 SB Ramps Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBR	All
Delay / Veh (s)	111.2	38.6	30.4	9.8	108.4	86.5	69.9
Vehicles Exited	124	40	151	114	185	109	723
Hourly Exit Rate	496	160	604	456	740	436	2892
Input Volume	717	272	859	598	880	489	3815
% of Volume	69	59	70	76	84	89	76

2: Richards Blvd & I-5 NB Ramps Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBR	All
Delay / Veh (s)	125.9	24.2	32.3	5.8	104.4	131.8	56.9
Vehicles Exited	76	255	250	261	24	256	1122
Hourly Exit Rate	304	1020	1000	1044	96	1024	4488
Input Volume	446	1152	1338	1511	120	1185	5752
% of Volume	68	89	75	69	80	86	78

3: Richards Blvd & Bercut Dr Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	68.5	20.3	8.1	514.0	466.0	472.9	158.0	45.3	27.2	401.7	409.7	358.8
Vehicles Exited	52	323	161	15	306	15	141	18	12	17	15	58
Hourly Exit Rate	208	1292	644	60	1224	60	564	72	48	68	60	232
Input Volume	239	1381	717	87	1783	76	739	87	54	109	87	326
% of Volume	87	94	90	69	69	79	76	83	89	62	69	71

3: Richards Blvd & Bercut Dr Performance by movement

Movement	All
Delay / Veh (s)	219.9
Vehicles Exited	1133
Hourly Exit Rate	4532
Input Volume	5685
% of Volume	80

13: I-5 NB Ramps & Performance by movement

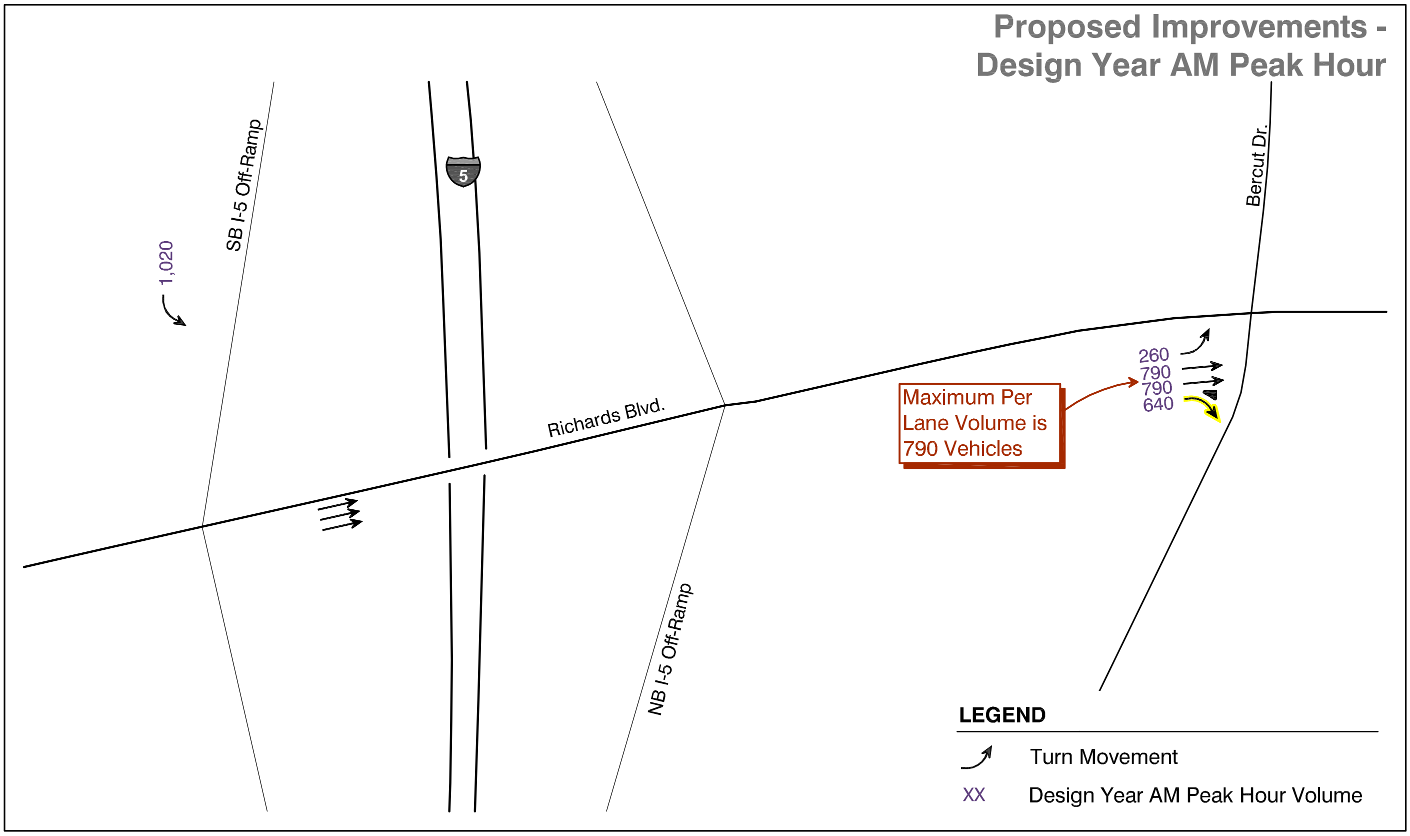
Movement	NBT	All
Delay / Veh (s)	15.2	15.2
Vehicles Exited	338	338
Hourly Exit Rate	1352	1352
Input Volume	1957	1957
% of Volume	69	69

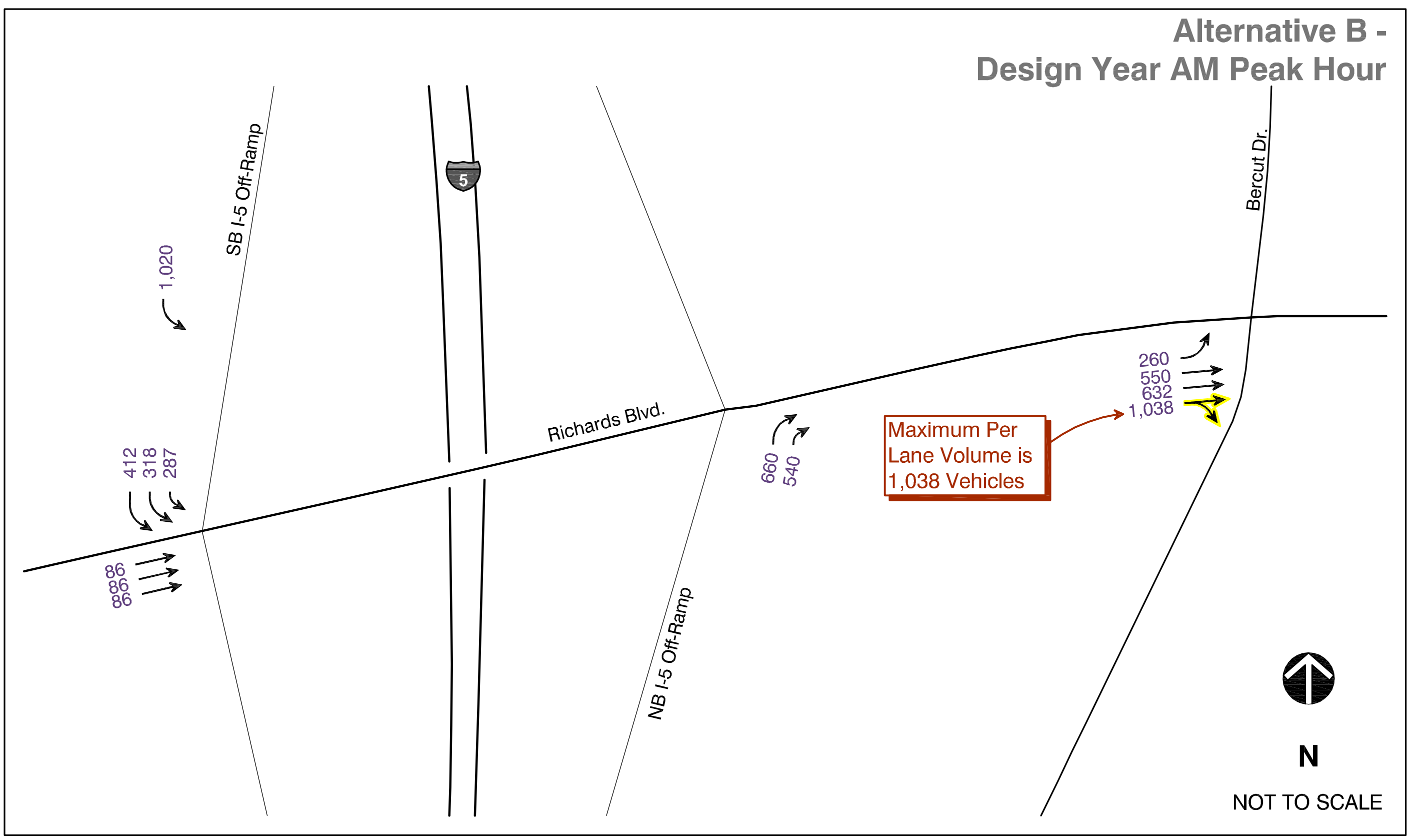
16: I-5 SB Ramps & Performance by movement

Movement	SBT	All
Delay / Veh (s)	28.8	28.8
Vehicles Exited	193	193
Hourly Exit Rate	772	772
Input Volume	1132	1132
% of Volume	68	68

Total Network Performance

Delay / Veh (s)	366.9
Vehicles Exited	1369
Hourly Exit Rate	5476
Input Volume	33654
% of Volume	16





FEHR & PEERS
TRANSPORTATION CONSULTANTS

EASTBOUND RICHARDS BOULEVARD PER LANE TRAFFIC VOLUME CALCULATION - ALTERNATIVE B

Dec 12, 2008 11
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FIGURE C-1

Mitigation Measure/Compliance Standard	Implementing Responsibility	Monitoring Responsibility for Implementing Measure	Timing	Verification of Compliance (Initials/Date)
Mitigation Measure 3.3-1: Design Plans and Specification Standards for Acceptable Backfill Material. The design plans and specifications shall specify standards for acceptable backfill materials and require testing (such as gradation) of native soil if it is proposed to be used as structural or pipeline backfill. Backfill would be mechanically compacted or jetted to meet the performance criteria specified by the Central Valley Flood Protection Board (CVFPB) and the United States Army Corps of Engineers (USACE).	City of Sacramento	City of Sacramento	Prior to approval of design plans and specifications; During construction	
Mitigation Measure 3.7-1: Avoid and Minimize Impacts on Migratory Birds and Raptors, Including White-Tailed Kite and Purple Martin In order to avoid and minimize potential impacts on nesting migratory birds and raptors, including white-tailed kite and purple martin, the following measures will be implemented. 1. Shrub and tree removal and construction activities are to be conducted during the non-nesting season (September 1 through January 31) whenever feasible. 2. If shrub and tree removal or construction activities occur during the nesting season (between February 1 and August 31), a qualified biologist will conduct a nesting survey of all habitat within 100 feet of the construction area for migratory birds and within 500 feet of the construction area for raptor habitat (large trees). Surveys will be conducted no less than 14 days and no more than 30 days prior to commencement of construction activities, and surveys will be conducted in accordance with the California Department of Fish and Game (CDFG) protocol as applicable. If no active nests are identified on or within 500 feet of the construction site, no further mitigation is necessary. This survey can be carried out concurrently with surveys for other species provided it does not conflict with any established survey protocols. A copy of the preconstruction survey will be submitted to the City. 3. If an active bird nest is identified within the described survey areas (out to 100 feet from construction area for migratory birds and out to 500 feet for raptors), a 500-foot no-disturbance buffer zone will be established between the nest and construction activity. The buffer zone may be reduced in consultation with the CDFG if it is determined that project activities won't cause the nest to fail. 4. Completion of the nesting cycle will be determined by a qualified ornithologist or biologist.	City of Sacramento	City of Sacramento	Prior to construction; During construction	
Mitigation Measure 3.7-2: Avoid, Minimize, and Mitigate for Impacts on Valley Elderberry Longhorn Beetle The measures presented below were also put forth in an Endangered Species Act Section 7 biological assessment prepared for impacts on the valley elderberry longhorn beetle (VELB). Caltrans was the	City of Sacramento	City of Sacramento	Prior to any ground disturbing activity and	

Mitigation Measure/Compliance Standard	Implementing Responsibility	Monitoring Responsibility for Implementing Measure	Timing	Verification of Compliance (Initials/Date)
lead federal agency for consulting with the US Fish and Wildlife Service (USFWS) on the proposed project's impacts on VELB. On June 3, 2009 Caltrans initiated formal consultation with the USFWS for concurrence on the effects to the federally listed threatened VELB species. The USFWS determined the project has the potential to directly and indirectly affect elderberry shrubs, the host plant for VELB. The USFWS also determined that the effects of the project can be appended to the *Programmatic Consultation Permitting Projects with Relatively Small Effects on the Valley Elderberry Longhorn Beetle Within the Jurisdiction of the Sacramento Field Office*. The USFWS agreed to the mitigation and conservation measures presented by Caltrans by issuing a Biological Opinion on October 8, 2009. This concludes the consultation process under Section 7 of the Endangered Species Act. The VELB mitigation and conversation measures are described below. Implementation of the following measures shall occur to avoid, minimize, and mitigate impacts on VELB that could occur in 12 elderberry shrubs that could be affected by project construction. These measures are from the USFWS's *Conservation Guidelines for the Valley Elderberry Longhorn Beetle, 9 July 1999* (VELB Guidelines). **Avoidance and Minimization Measures** *Establish a Minimum 20-Foot-Wide Buffer around All Elderberry Shrubs Where Feasible* Before any ground-disturbing activity, a qualified biologist will flag the elderberry shrubs that will be retained adjacent to the biological study area. Thereafter, the City will ensure that a minimum 4-foot-tall temporary, plastic mesh–type construction fence (Tensor Polygrid or equivalent) is installed at least 20 feet from the driplines of the flagged elderberry shrubs within the biological study area. This fencing is intended to prevent encroachment by construction vehicles and personnel. The fencing will be strung tightly on posts set at a maximum interval of 10 feet. The fencing will be installed in a way that prevents equipment from enlarging the work area beyond the delineated work area. The fencing will be checked and maintained weekly until all construction is completed. This buffer zone will be marked by signs stating; "This is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." Signs will be placed at intervals of 50 feet and must be readable at a distance of 20 feet. No construction activity, including grading, will be allowed until this condition is satisfied. No grading, clearing, storage of equipment or machinery, or other disturbance or activity may occur until a representative of the City has inspected and approved all temporary construction fencing. The fencing			during construction	

Mitigation Measure/Compliance Standard	Implementing Responsibility	Monitoring Responsibility for Implementing Measure	Timing	Verification of Compliance (Initials/Date)
and a note reflecting this condition will be shown on the construction plans. *Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel* Before any work occurs in the project area, including grading, a qualified wildlife biologist will conduct mandatory contractor/worker awareness training for construction personnel. The training will be provided to all construction personnel to brief them on the need to avoid impacts on biological resources and the penalties for not complying with biological mitigation requirements. If new construction personnel are added to the proposed project, the contractor's superintendent will ensure that the new personnel receive the mandatory training before starting work. An environmental awareness handout will be provided to each person, describing and illustrating sensitive resources (i.e., nesting birds and raptors, elderberry shrubs, and native trees) that will be avoided during project construction and identifying all relevant permit conditions. *Implement Dust Control Measures* The City will ensure that dust control measures are implemented for all ground-disturbing activities in the project area. These measures may include application of water to graded and disturbed areas that are unvegetated; however the City or its contractor may use other measures more appropriate for site-specific conditions, as long as dust is minimized to the maximum extent practicable. To avoid attracting Argentine ants, at no time will water be sprayed within the driplines of elderberry shrubs. Pursuant to the USFWS VELB Guidelines, the City will implement the following measures to mitigate for the direct and indirect impacts on VELB before groundbreaking occurs for the proposed project. **Compensatory Mitigation** *Transplant Directly Affected Elderberry Shrubs* Elderberry shrubs will be transplanted when the plants are dormant, approximately November through the first two weeks in February, after they have lost their leaves. Transplanting during the non-growing season will reduce shock to the plant and increase transplantation success. The City will follow the specific transplanting guidance provided in the USFWS VELB Guidelines. Shrubs 1 and 12 will be transplanted to the French Camp Conservation Bank, or another Service-approved site. Elderberry seedlings and associated native plants will also be established at the site according to the ratios outlined in the Guidelines. See USFWS Biological Opinion, page 6, Table 1 issued on October 8, 2009 for the ratios. *Compensate for Direct Impacts on Elderberry Shrubs* Shrubs 1 and 12 would be directly affected by the proposed project. According to the USFWS VELB Guidelines, adversely affected shrubs that are "transplanted or destroyed" should be mitigated for according to the measures outlined in Table 1 of the USFWS VELB Guidelines. The City will mitigate for impacts on the shrubs by purchasing mitigation credits at a USFWS-approved mitigation bank. A				

Mitigation Measure/Compliance Standard	Implementing Responsibility	Monitoring Responsibility for Implementing Measure	Timing	Verification of Compliance (Initials/Date)
summary of the required mitigation is provided in Table 3.7-2. As shown in the table, the proposed project would require 22 elderberry seedlings and 28 associated native plants (six VELB credits) to be planted at a USFWS-approved mitigation bank. Currently, VELB mitigation credits are available at French Camp Conservation Bank. The shrubs identified for transplantation will be transplanted to this mitigation bank.				

Table 3.7-2. Compensation for Impacts on VELB Habitat

Location	Stem Diameter Class at Ground Level in Centimeters (inches)	Exit Holes?	Stem Count	Elderberry Seedling Ratio	Associated Native Plant Ratio	Total Elderberry/ Associated Natives to Be Planted
Non-riparian	2.5–7.6 (1–3)	No Yes	5 0	1:1 2:1	1:1 2:1	5/5 0/0
Non-riparian	7.6–12.7 (3–5)	No Yes	1 0	2:1 4:1	1:1 2:1	2/2 0/0
Non-riparian	>12.7 (>5)	No Yes	3 1	3:1 6:1	1:1 2:1	9/9 6/12
Riparian	2.5–7.6 (1–3)	No Yes	0 0	2:1 4:1	1:1 2:1	0/0 0/0
Riparian	7.6–12.7 (3–5)	No Yes	0 0	3:1 6:1	1:1 2:1	0/0 0/0
Riparian	>12.7 (>5)	No Yes	0 0	4:1 8:1	1:1 2:1	0/0 0/0
Total	–	–	**10**	–	–	**22/28**

Mitigation Measure/Compliance Standard	Implementing Responsibility	Monitoring Responsibility for Implementing Measure	Timing	Verification of Compliance (Initials/Date)
Mitigation Measure 3.7-3: Avoid and Minimize Impacts on Burrowing Owl To avoid and minimize potential impacts on burrowing owls, the following measures will be implemented. Preconstruction surveys for burrowing owls will be conducted in accordance with *Burrowing Owl Survey Protocol and Mitigation Guidelines*[1], which calls for surveying out to 500 feet from project limits where suitable habitat is present. If owls are identified in the biological study area, mitigation measures will be implemented as outlined in the CDFG's *1995 Staff Report on Burrowing Owl Mitigation*[2]. These measures will include those listed here. 1. If occupied owl burrows are found within the biological study area, a determination will be made by a qualified biologist in consultation with the CDFG regarding whether work will affect the occupied	City of Sacramento	City of Sacramento	Prior to construction	

[1] The California Burrowing Owl Consortium. *Burrowing Owl Survey Protocol and Mitigation Guidelines*. 1993. The California Burrowing Owl Consortium, San Francisco, CA.
[2] California Department of Fish and Game. 1995. *Staff Report on Burrowing Owl Mitigation*. Sacramento, CA.

Mitigation Measure/Compliance Standard	Implementing Responsibility	Monitoring Responsibility for Implementing Measure	Timing	Verification of Compliance (Initials/Date)
burrows or disrupt reproductive behavior. 2. If it is determined that construction will affect occupied burrows during August through February, the subject owls will be passively relocated from the occupied burrow(s) using one-way doors. One-way doors will be in place for a minimum of 48 hours before burrows are excavated. 3. If it is determined that construction will physically affect occupied burrows or disrupt reproductive behavior during the nesting season (March through July), avoidance is the only mitigation available. Construction will be delayed within 300 feet of occupied burrows until it is determined that the subject owls are not nesting or until a qualified biologist determines that juvenile owls are self sufficient or are no longer using the natal burrow as their primary source of shelter.				
Mitigation Measure 3.7-4: Avoid and Minimize Impacts on Swainson's Hawk If construction occurs during the breeding season (February 1–August 31), the City will conduct CDFG-recommended protocol-level surveys within 0.8 kilometer (0.5 mile) of the project area prior to construction as required by the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley*[3] or as required by the CDFG in the future. If no active nests are identified during the survey, no additional mitigation is required. If active nests are found in the vicinity of the construction area, mitigation measures consistent with the *Staff Report Regarding Mitigation for Impacts to Swainson's Hawks* (*Buteo swainsoni*) *in the Central Valley of California*[4] will be incorporated in the following manner or as directed by the CDFG. 1. If an active nest is found, no intensive new disturbances (e.g., construction activities that create sudden loud noises or vibrations) or other project-related activities that may cause nest abandonment or forced fledging, can be initiated within 200 yards (buffer zone) of an active nest between March 1 and September 15. The size of the buffer area may be adjusted if a qualified biologist and the CDFG determine it would not be likely to have adverse effects on the hawks. No project activity will commence within the buffer area until a qualified biologist confirms that the nest is no longer active. 2. Active nest trees (nest trees currently occupied or trees supporting a nest within the last five years) will not be removed unless there is no feasible way of avoiding removal of the tree. If a nest tree must be removed, a management authorization (including conditions to offset the loss of the nest tree) must be obtained from the CDFG with the tree removal period specified; it is generally between October 1 and February 1.	City of Sacramento	City of Sacramento	Prior to construction	

[3] Swainson's Hawk Technical Advisory Committee. 2000. *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley*. Sacramento, CA.

[4] California Department of Fish and Game. 1994. *Staff Report Regarding Mitigation for Impacts to Swainson's Hawks (Buteo swainsoni) in the Central Valley of California.*

Checklist Continued

Mitigation Measure/Compliance Standard	Implementing Responsibility	Monitoring Responsibility for Implementing Measure	Timing	Verification of Compliance (Initials/Date)
3. If construction or other project-related activities that may cause nest abandonment or forced fledging are necessary within the buffer zone, monitoring of the nest site (funded by the project proponent) by a qualified biologist will be required to determine if the nest is abandoned. If the nest is abandoned and if the nestlings are still alive, the project proponent will fund the recovery and hacking (controlled release of captive reared young) of the nestling(s). 4. Routine disturbances, such as routine maintenance activities within 0.4 kilometer (0.25 mile) of an active nest, will not be prohibited unless consultation with the CDFG determines that these activities will affect the active nest.				
Mitigation Measure 3.7-5: Avoid and Minimize Impacts on Bats Prior to the removal of any trees, the City will conduct a preconstruction survey to determine if roosting pallid or Townsend's big-eared bats are present. The surveys should be conducted 1 week prior to the start of construction at dusk, when bats would be expected to be present and active. This survey will be conducted by a wildlife biologist qualified to identify the species of bats using these roosts. Surveys will be conducted using an ultrasonic bat detector (such as AnaBat or SonoBat) to determine the presence of bats within the biological study area. Detectors will be positioned in the immediate vicinity of trees deemed to be suitable for roosting by the biologist. If the preconstruction surveys determine that no bats are roosting within the biological study area, no further mitigation is required. If roosting bats are present, the biologist will determine if the roost is a day roost or is a maternal roost. Maternal roosts form as early as March and disband as late as August. If the roost is determined to be a maternal roost, construction activities that may cause the abandonment of the maternal roost or cause harm to bats will be prohibited until the biologist determines that the bat pups have left the roost and are able to fend for themselves. Specific activities that may cause the abandonment of an identified maternal roost will be defined based on site-specific conditions around the roost during consultation with CDFG. If the roost is determined to be a day roost, normal construction activities nearby should not be prohibited. It is believed that day roosting bats occurring there are already acclimated to high levels of noise and disturbance associated with current vehicle traffic on I-5 and car, pedestrian traffic, and maintenance activities on the adjacent roadways. If an occupied day roost is to be removed (i.e. tree removal), the City will consult with CDFG regarding the location and installation of alternative day roost sites (i.e. bat boxes).	City of Sacramento	City of Sacramento	Prior to removal of any trees and during construction	
Mitigation Measure 3.7-6: Avoid, Minimize, and Mitigate Impacts on Protected Trees *Redesign the Proposed Project to Avoid and Minimize Impacts on Protected Trees* The City will revise the project design to the extent feasible to avoid disturbing or removing protected trees. *Mitigate for the Removal of Protected Trees* The City Department of Transportation's Urban Forest Services (UFS) project site assessment on	City of Sacramento	City of Sacramento	Prior to approval of project design and during construction; Ongoing	

Mitigation Measure/Compliance Standard	Implementing Responsibility	Monitoring Responsibility for Implementing Measure	Timing	Verification of Compliance (Initials/Date)
November 24, 2009 found that City and heritage trees proposed for removal in the project area totaled an aggregate diameter at breast height (dbh) of 464 inches. The UFS standard assessment of City and heritage trees assigns a mitigation value at a rate of $325 per dbh inch (trunk diameter at a height of 4.5 feet). Applying this rate, the total mitigation value for City and heritage tree removal for the proposed project totals $150,800.00. Per consultation with the UFS, in lieu of paying this mitigation value, the City could mitigate for the removal of City and heritage trees within the project area by implementing the following measures prior, during, and/or post project construction, as applicable: 1. Submit a planting and irrigation plan for UFS review and approval prior to ground disturbance. 2. Replant trees, under the direction of the UFS, at a ratio of one (1) twenty four-inch (24”) box tree per eight dbh inches (8”) of City and heritage tree removal (replant ratio of 1:8). The UFS shall approve the locations and species of the trees. 3. At a minimum, tree planting and associated monitoring will adhere to the following measures (for City tree mitigation planting and monitoring, other designs may be approved pending UFS review): • Trees will be planted at a spacing of 40 feet to 60 feet on center. • Trees will be planted in a gradual mound approximately 6 feet across and 4 inches above the surrounding grade. • All trees will be mulched with wood chips 4 inches to 6 inches deep, (minimum area of 8 feet by 8 feet per tree). • Trees growth and overall condition will be monitored 3 times per year, (April/July/September) for a 8 year period during which any dead or poorly performing trees will be replaced during the next fall or early spring. • Irrigation will be tested 3 times per year, (April/July/September) and adjusted as needed to provide good growing conditions for all planted trees. • Each planted tree will be irrigated by an 8-foot diameter ring of durable drip tubing installed below wood chips with 4 interior lateral lines to serve the root area of the newly planted trees (other designs may be approved pending UFS review). • For the 24” box tree plantings one of the following, or equivalent, species will be chosen (species substitution is subject to UFS review and approval): ▪ Chinese Pistache ‘Keith Davey’*(Pistacia chinensis)* ▪ Sawtooth Oak (*Quercus acutissima)* ▪ Persian Oak *(Quercus castaniefolia)* ▪ Turkey Oak *(Quercus cerris)*				

Checklist Continued

Mitigation Measure/Compliance Standard	Implementing Responsibility	Monitoring Responsibility for Implementing Measure	Timing	Verification of Compliance (Initials/Date)
▪ Blue Oak *(Quercus douglasii)* ▪ Valley Oak *(Quercus lobata)* ▪ Southern Live Oak *(Quercus virginiana)* ▪ Interior Live Oak *(Quercus wislizenii)*				
Mitigation Measure 3.7-7: Avoid, Minimize, and Mitigate for Impacts on Wetlands and Waters *Redesign the Proposed Project to Avoid and Minimize Impacts on Wetlands and Other Waters* *Avoid Indirect Impacts on Seasonal Wetland Adjacent to Project Area* The City will install construction barrier fencing (including concrete barriers and/or sediment fencing) to prevent fill materials from entering the seasonal wetland (SW-4) located behind the chain-link fence at the eastern edge of the fenced water treatment facility property on Bercut Drive. Before construction, the contractor will work with the project engineer and a resource specialist to identify the locations for the barrier fencing and will mark those locations with stakes or flagging. The protected area will be clearly identified on the construction specifications. The minimum distance that the construction barrier fencing will be placed from seasonal wetland SW-4 is the distance between the seasonal wetland and the existing chain-link fence. The construction barrier fencing will be in place before construction activities are initiated. The fencing will be maintained by the City or its contractor throughout the duration of the construction period. If the fencing is removed, damaged, or otherwise compromised during the construction period, construction activities will cease until the fencing is replaced. *Obtain and Comply with Federal and State Permits and Requirements* For the three seasonal wetlands and nine drainage ditches located in the project area, the City will obtain a CWA Section 404 permit from the USACE for the placement of fill within waters of the United States and Section 401 certification from the Regional Water Quality Control Board (RWQCB). The City will also need to obtain waste discharge requirements (WDRs) from the RWQCB. All conditions that are attached to the Section 404 and 401 permits or WDRs will be implemented as part of the proposed project. The conditions will be clearly identified in construction plans and specifications and monitored during and after construction to ensure compliance. *Compensate for Permanent Loss of Seasonal Wetland Habitat* The City will compensate for permanent impacts on waters of the United States (including wetlands) and waters of the state to ensure there is no net loss of habitat functions and values. The compensation will be determined as part of the state (Section 401 water quality certification or WDRs) and federal (Section 404 nationwide permit) processes and may be a combination of offsite restoration/creation and mitigation credits. Compensation ratios will be a minimum of 1:1 (1 acre of mitigation for every 1 acre of impact). Ratios will be based on site-specific information and determined through coordination with	City of Sacramento	City of Sacramento	Prior to ground disturbance and during construction	

Mitigation Measure/Compliance Standard	Implementing Responsibility	Monitoring Responsibility for Implementing Measure	Timing	Verification of Compliance (Initials/Date)
state and federal agencies as part of the permitting process.				
Mitigation Measure 3.9-1: Comply with the recommendations of the Health and Safety Plan, Lead Compliance Plan, and Asbestos Abatement Plan developed by the City for the project and approved by the appropriate agencies. Given the history of soil and groundwater contamination within the project site, there is a potential to encounter known and previously unidentified contamination. As such, an appropriate health and safety plan will be prepared to protect construction workers and the public from potential health hazards. The proposed project requires the removal of yellow traffic striping. The City will do so in compliance with Department of Toxic Substances Control guidelines, which includes development of an appropriate lead compliance plan. In addition, two asbestos-containing pipes would be demolished in the course of project construction activities. An appropriate asbestos abatement plan would be developed, and all abatement work would be completed using a contractor certified by the California Department of Health Services[5].	City of Sacramento	City of Sacramento	Prior to project approval and during construction	
Mitigation Measure 3.13-1: Eliminate Excessive Nighttime Light and Glare Lighting used during nighttime construction should implement light fixture shielding systems to emit light down to areas intended to be illuminated, and not into surrounding areas, thereby eliminating excessive nighttime light and glare that may affect nearby traffic and residents.	City of Sacramento	City of Sacramento	During construction	
Mitigation Measure 3.14-1: Consult with a Qualified Paleontologist In the event that any paleontological features or deposits are discovered during construction-related earth-moving activities, all work within 100 feet of the resource will be halted, and the City will consult with a qualified paleontologist to assess the significance of the find. Paleontological test excavations will be conducted by a qualified paleontologist to aid in determining the nature and integrity of the find. If the find is determined to be significant by the qualified paleontologist, representatives of the City and the qualified paleontologist will coordinate to determine the appropriate course of action. All significant paleontological resources recovered will be subject to scientific analysis and professional museum curation. In addition, a report will be prepared by the qualified paleontologist according to current professional standards.	City of Sacramento	City of Sacramento	During construction	
Mitigation Measure 3.14-2: Consult with a Qualified Archaeologist	City of	City of	During	

[5] Blackburn Consulting. 2008. *Initial Site Assessment: Richards to Railyards Access Improvement Project.* October.

Mitigation Measure/Compliance Standard	Implementing Responsibility	Monitoring Responsibility for Implementing Measure	Timing	Verification of Compliance (Initials/Date)
In the event that any historic subsurface features, artifacts, or deposits and/or prehistoric subsurface archaeological features or deposits, including locally darkened soil ("midden"), that could conceal cultural deposits, animal bone, obsidian, or mortars are discovered during construction-related earth-moving activities, all work within 100 feet of the resource will be halted, and the City will consult with a qualified archaeologist to assess the significance of the find. Archaeological test excavations will be conducted by a qualified archaeologist to aid in determining the nature and integrity of the find. If the find is determined to be significant by the qualified archaeologist, representatives of the City and the qualified archaeologist will coordinate to determine the appropriate course of action. All significant cultural materials recovered will be subject to scientific analysis and professional museum curation. In addition, a report will be prepared by the qualified archaeologist according to current professional standards.	Sacramento	Sacramento	construction	
Mitigation Measure 3.14-3: Consult with an Archaeologist and Native American Representatives If a Native American site is discovered, the evaluation process will include consultation with the appropriate Native American representatives. If Native American archaeological, ethnographic, or spiritual resources are involved, all identification and treatment will be conducted by qualified archaeologists who are certified by the Society of Professional Archaeologists (SOPA) or meet the federal standards as stated in the CFR (36 CFR 61), or both, and Native American representatives who are approved by the local Native American community as scholars of the cultural traditions. In the event that no such Native American is available, persons who represent tribal governments or organizations in the locale in which resources could be affected will be consulted. If historic archaeological sites are involved, all identified treatment is to be carried out by qualified historical archaeologists, who will meet either Register of Professional Archaeologists (RPA) or 36 CFR 61 requirements.	City of Sacramento	City of Sacramento	During construction	
Mitigation Measure 3.14-4: Stop Work and Consult with the County Coroner or NAHC, or Both If a human bone or bone of unknown origin is found during construction, all work will stop within 100 feet of the find, and the county coroner will be contacted immediately. If the remains are determined to be Native American, the coroner will notify the Native American Heritage Commission, which will notify the person most likely believed to be a descendant. The most likely descendant will work with the contractor to develop a program for re-interment of the human remains and any associated artifacts. No additional work is to take place within the immediate vicinity of the find until the identified appropriate actions have taken place.	City of Sacramento	City of Sacramento	During construction	

NOTICE OF DETERMINATION

To: X Office of Planning and Research
1400 10th Street, Room 222
Sacramento, CA 95814

X County Clerk
County of Sacramento

ENDORSED
SACRAMENTO COUNTY
DEC 17 2009
CRAIG A. KRAMER, CLERK RECORDER
BY [signature] DEPUTY

From: City of Sacramento
Community Services Dept.
300 Richards Blvd, Third Floor
Sacramento CA 95834

Subject: **Filing of Notice of Determination in compliance with Section 21108 or 21152 of the Public Resources Code.**

Project Title: Access Improvements from Railyards to Richards Boulevard and Interstate 5

State Clearinghouse #	Lead Agency	Contact Person	Telephone
	City of Sacramento	Jennifer Hageman	916-808-5538

Applicant Name	Address	Telephone
City of Sacramento attn: Nader Kamal	915 I Street, Sacramento, CA 95814	916-808-7035

Project Location (include county): At the interchanges of Interstate 5 and Richards Boulevard, Sacramento

Project Description: Improvements in the area of the interchange to provide short-term operational and circulation improvements and access to areas planned for development in the City's General Plan. The project is planned to accommodate future interchange improvement projects.

This is to advise that the City of Sacramento, Department of ☐/Zoning Administrator☐/Planning Commission ☐/ City Council ☒ has approved the above described project on December 15, 2009 and has made the following determination regarding the above described project:

1. The project will ☒/ will not ☐) have a significant effect on the environment.
2. ☐ An Environmental Impact Report was prepared for this project pursuant to the provisions of CEQA.
   ☒ A Negative Declaration was prepared for this project pursuant to the provisions of CEQA.
3. Mitigation Measures were ☒/were not ☐) made a condition of the approval of the project.
4. ☐ A statement of Overriding Considerations was adopted for this project.
5. ☐ Findings were made pursuant to the provisions of CEQA

This is to certify that the final Negative Declaration and the record of project approval is available to the General Public at:

City of Sacramento, Community Development Department
300 Richards Boulevard, Third Floor, Sacramento, California 95811

Jennifer [signature] — Senior Planner — 12/17/09
Signature (Lead Agency Contact) — Title — Date

Date received for filing at OPR — Date received for filing at Clerk

RECEIVED
DEC 17 2009
STATE CLEARING HOUSE

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CK#: 94506